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Physical Therapy in Medical Education*

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Whatever the physician may be, above all else he should be a healer. His duty to his patient is to use all therapeutic measures conducive to the restoration of the patient's health. Therefore, the physician must employ medicine, surgery and physical therapy, either singly or in suitable combinations.

Alan Gregg¹, in a recent article, gives an inventory of special opportunities for development in medicine in the decade now before us. In this article he states: "A curious phenomenon in American medicine is the deft elimination of much reference to physical therapy. Almost as those who keep their children ignorant of the facts of life, we appear to protect the American medical student from the knowledge of physical therapy, mindful, I suppose, of the abuses imputed to osteopaths and chiropractors. Of course, there is much the same results: thus protected, our graduates angrily complain of competition from those whose knowledge it is tabu to acquire . . . The current unabashed ignorance of physical therapy in this country leaves it an excellent opportunity for development in American medicine."

There is a growing consciousness on the part of the medical profession regarding the great value of physical therapy. This new outlook has been aided by the activities of the Council on Physical Therapy of the American Medical Association and its publications of conservative articles on this subject. These articles have been collected and published in the "Handbook of Physical Therapy," the third edition of which appeared in 1939.

The Council on Medical Education and Hospitals of the American Medical Association has cooperated with the Council on Physical Therapy to advance the teaching of physical therapy to medical students. It is the duty of every medical school to teach the principles and application of medicine, surgery and physical therapy so that the medical profession may use all these measures to the best advantage. The foundation of this instruction is the proper teaching of the medical student.

*Read before the Academy of Physical Medicine, Richmond, Va., April 25, 1940.

1. Gregg, Alan: Addenda to the Agenda for the Decade 1940-1950, J.A.M.A. 114:13:1139, (March 30) 1940.

It is most important that physical therapy be taught by a good teacher. Dr. Irving S. Cutter recently sent to the faculty of Northwestern University Medical School the following criteria of a good teacher that was given to him by one of the students:

"1. The skill of separating *"wheat and chaff"* in dealing with voluminous literature.

"2. The gift of capacity to outline and summarize *clearly*.

"3. The ability to present material more *vividly* and *forcefully* than is possible in the more formal language of textbooks; to reenforce memory and to provoke thought.

"4. *Fair* tests and grading. Ten years after graduation a very successful man still dislikes a course because one instructor repeatedly graded him unfairly.

"5. A *warm, personal interest in his students and his subject*. Students quickly react to the emotional attitude of a teacher. This factor permits a teacher to project a note of encouragement, or a shadow, over the future work of his students. This is the factor which makes us work for a teacher's course and *like it*.

"6. *Good professional standing*, which stimulates the student's respect for the teacher and the subject matter presented."

Fundamentals of physical therapy instruction for the medical student in physical therapy should be commenced in his physiology course. At Northwestern University Medical School, through the cooperation of Dr. Ivy, professor of physiology, a member of the Physical Therapy Department teaches part of the course in applied physiology. This course includes experiments demonstrating the physiologic effects of (1) heating of tissues by contrast baths, whirlpool baths, paraffin bath, mud bath, infra-red radiations; (2) medical and surgical diathermy; (3) direct or galvanic current; (4) interrupted galvanic, faradic and sinusoidal current. This course is given in the second year of the medical course.

In the third or fourth year, the medical student should be given a didactic course which can be covered adequately by one lecture a week during a single semester. At Northwestern University Medical School these eleven lectures are given by various members of the staff of the physical therapy department. The textbook used is the "Handbook of Physical Therapy" compiled and edited by the Council on Physical Therapy and published by the American Medical Association. The lectures are given with the following principles in the foreground:

1. Ninety per cent of the necessary work in physical therapy can be accomplished by heat, massage and exercises with no other equipment than can be made by any mechanic at small cost.

2. Teaching the use of physical agents in the home, to aid the medical student in his most urgent postgraduate problem, the care of patients in their homes.

3. To present a review of practical physics of high frequency currents and ultraviolet radiation so that the future practitioner will be able to judge the

physical efficiency of the various machines which numerous salesmen will urge him to buy as soon as he opens an office.

4. The importance of consulting the Council on Physical Therapy in regard to the results of their examination of apparatus. Each student is given the free booklet issued by this Council—"Apparatus Accepted."

5. The subject is approached not as a specialty but as a part of general medicine, coordinated, so that it will not be independent but correlated with the courses in medicine and surgery.

Lecture number one is on the physiologic effects, forms of application and therapeutic indications of heat. The importance of prescribing physical agents on a definite prescription is emphasized and the student is given a mimeographed prescription sheet for the home application of heat.

The second lecture is on massage. A demonstration of the technic of massage is given. Its physiologic effects and uses are stated, and the importance of its definite prescription by a physician is emphasized. Again, the student receives a mimeographed sheet of directions for home use of massage as prescribed by a physician.

Lectures three, four and five teach the place of exercise in surgical, medical and nervous and mental conditions. The various types of exercise are considered. The importance of occupational therapy contributing to the definite exercise program for certain surgical conditions is emphasized. To demonstrate the method of prescribing exercise, each student is given a mimeographed copy of body mechanic exercises as well as exercises for each joint.

Motion pictures prepared by the Council of Physical Therapy are shown at the sixth session. These pictures can be obtained free on application to the Bureau on Exhibits of the American Medical Association, but because they are in great demand requests should be made for their use at least two months in advance.

These pictures illustrate:

1. Effects of Heat and Cold.
2. Effects of Massage.
3. Technic of Massage.
4. Aids in Muscle Training.
5. Underwater Therapy.
6. Occupational Therapy.

The subject of hydrotherapy is discussed in lecture seven. Only those applications of water, both local and general, requiring apparatus that can be found in any home, are given consideration.

Applied physics is the subject of the eighth lecture given by the lecturer on applied physics. The subject of medical electrophysics is discussed from a practical viewpoint.

In lecture nine, the uses and abuses of electrotherapy are discussed. Special

emphasis is placed on the advantages of using only apparatus accepted by the Council on Physical Therapy and described in their publication "Apparatus Accepted."

The physics of infra-red, visible and ultraviolet radiation as applied to medicine, is given in lecture ten by the lecturer on applied physics.

The final lecture considers the sources, biologic effects, dosage and therapeutic indications for ultraviolet radiation.

In the fourth year, an elective clinical course was offered. Students, in groups of from four to six, were assigned to the physical therapy department, two hours daily, for one week. This was not successful, because the same patients come to the department at the same hour during each visit. This meant that the student saw the same individuals while he was in attendance at the clinic. As most of the treatments consisted of massage and exercise, it was impossible, in the short period available, to teach the medical student how to give treatments himself.

As a result of this experience, we are seeking the aid of the various clinical departments to give their clinical clerks the indications and limitations of physical therapy for their patients and to have these clinical clerks follow an interesting case to the physical therapy department to observe and note the result of treatment.

To actually teach and demonstrate physical therapy, it is necessary for the medical school to have a physical therapy department under the division of medicine with the director a member of that division and with the rank of assistant or associate professor. It is believed that physical therapy should come under the department of medicine because logically it is a form of therapeutics and therapeutics is usually in the department of medicine.

All the teaching hospitals of the school should have physical therapy departments with a medical director in charge. There should be a large outpatient department.

The director of this department should be a clinician, thoroughly trained in physical therapy, able to further knowledge in his subject as well as to impart it. He must be an investigator. The subject of his investigation must be the sick human being. To secure such a teacher and investigator, the medical school must pay him a salary sufficient to enable him to devote one-third or one-half of his time to this important position.

Associated with the director should be a full time research associate. This person should be trained in physiology and should do his laboratory research in cooperation with the department of physiology. Such an assistant, in addition, should be well trained in physical therapy technic so that he can correlate his laboratory research with clinical studies.

In addition, a consulting physicist should be an integral part of the physical therapy department to assist in the research and teaching. In our department, this physicist has the title of lecturer in applied physics. He gives two lectures in the third year program. His assistance is secured in the solution of research programs, particularly those involving physics.

The investigations of the physical therapy department should follow Karsner and Goldblatt's suggestions which appeared in their article "Evaluation of Methods Used in Physical Therapy²." In doing this clinical and laboratory research, the cooperation of the other clinical departments is sought for two purposes. First: To secure the aid of the clinical department in making the diagnosis and to judge the results secured by the physical therapy department. Second: In this manner the cooperating clinical department becomes physical therapy minded. This, in turn, aids teaching by the clinical departments concerned. They are able to point out to the medical student the indications as well as the limitations of this form of therapy.

In the fifth, or internship year, it is believed that interns on a rotating internship should be assigned to a part time service in the Physical Therapy department. Usually, this can be done in their time on laboratory service. The Council on Physical Therapy prepared a section of physical therapy which is included in the manual for interns published by the American Medical Association.

The physical therapy department of a medical school should offer postgraduate instruction for the medical profession. The physical therapy department of Northwestern University Medical School does this by five different methods, as follows:

1. An intensive course in physical therapy of four weeks' duration. In presenting this course, the school does so with the desire to cooperate with the Council on Physical Therapy of the American Medical Association in its educational plan, and with the policy to discountenance short cuts to immature medical specialization, but to qualify physicians to administer the different forms of physical therapy in their practice. It is felt that this short course will serve as a substantial foundation for the intelligent application of physical therapy. The important point emphasized in this course is that training in physical therapy by clinical observation alone is unsatisfactory and that there must be instruction in the physical and biological principles involved. The teaching consists of lectures, observations of patients, their physical therapeutic prescriptions, demonstrations of technic, clinics and actual treatment of patients under supervision.

2. Advanced Physical Therapy. This course primarily concerns the physician who intends to specialize in physical therapy. At our school, this course is given in quarters according to demand and covers both clinical and didactic instruction.

3. Residencies. In the United States there are not a sufficient number of physicians qualified to be directors of hospital physical therapy departments and to teach physical therapy in medical schools. The establishment of residencies in physical therapy on the same basis as other specialties would fill this demand. The Council on Medical Education of the American Medical Association has approved three institutions for this purpose. One of these is Michael Reese Hospital in Chicago. This department is in charge of Dr. C. O. Molander, assistant professor of physical therapy at Northwestern University Medical School.

2. Karsner, Howard T. and Goldblatt, Harry G.: *Evaluation of Methods Used in Physical Therapy. Handbook of Physical Therapy*, 3rd Ed., Chicago, American Medical Assn., 1939.

4. University Extension Courses. Our physical therapy department is actively cooperating with the departments of medicine and surgery in their two to four weeks extension courses. For instance, in connection with their lectures on chronic arthritis and fractures, we give our program in the use of physical agents.

5. Medical Society Meetings. Our physical therapy department cooperates with state and county medical societies by giving practical talks on physical therapy before these societies.

This paper endeavors to present what the medical school should do to enable the medical profession to use physical therapy, medicine and surgery properly, either singly or in suitable combinations. The facts presented do not represent an idealistic situation but give what is being done in a medical school with more than twelve years experience in teaching physical therapy. Not until every medical school endeavors to formulate a teaching program in physical therapy will our full duty to medical students and the medical profession be fulfilled. Only by this means will physical therapy attain the position in the art of healing which it deserves.

Misery

Old father John is sick and sad;
A careless man was he
Who lost the health he thought he had
And now has misery.

His doctor comes; says he, My friend
What may the ailment be?
Doc, I'm 'fraid I'm near the end;
I'm full o' misery.

But tell the doctor; tell me, first,
What may the chief hurt be?
What would you say was likely most
To cause this misery?

Doc, I am a sick ole man;
Just 'twixt yourself and me
I hurt all over; poor ole Jan's
Chock full o' misery.

W. L. S.

(Dedicated to those who fail to give a good history of P. I.)

A Four Year Correlative Teaching Plan for the Nervous System*

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The successful teaching of the nervous system and its diseases is admittedly one of the most difficult undertakings of a medical faculty. There are, at least, two chief reasons for this situation. One is the intrinsically complex, if not abstruse, nature of the material concerned and the other the lack of correlation between departments contributing integral units toward that which should form an intimately interrelated whole. Only lucid individual teaching can mitigate the misfortune of complexity, but it is our firm belief, founded in fruitful experience, that the introduction of a definite plan of correlation between teaching departments will result in a more useful understanding of the nervous system and its dysfunction.

It should be noticed primarily that the plan hereby outlined can be pursued only in such instances where the teachers concerned hold each other in respect and friendly esteem. This does not imply the necessity or desirability of a servile attitude of mutual admiration. The individuals concerned must each preserve his own identity, insisting on the validity of his own criteria but willing to acknowledge the existence of other and alternative viewpoints. The students will, at first, be puzzled by such a procedure, expecting in their own minds the asides which they have learned to expect in their medical curriculum and which are the usual accompaniment of "not-very-enlightened" personal differences. Later, however, a lively enthusiasm will prevail among them and, stimulated by the example of legitimate differences of opinion freely voiced, they will assume an active and personal interest in the diagnostic clinical problems involved and pitch into the difficulties of weighing evidence which would otherwise be ignored lethargically. We have noticed four beneficial changes in our students since the introduction of the scheme about to be outlined. They are generally more interested and consequently learn more; they have developed a personal sense of responsibility which is based upon the novel discovery that they can form tenable opinions of their own; they have acquired something of the technique of arriving at diagnoses by weighing the validity of evidence gathered by themselves; and lastly they have been more active in the examination of their patients.

We may now pass to the formal plan of instruction as employed by the University of Georgia during the past few years.

GROSS ANATOMY (First Year, Trimesters 1 and 2)

The student's instruction in the nervous system is begun in the usual way in Gross Anatomy. The peripheral and autonomic systems are very completely studied from the macroscopic standpoint. Special and detailed instruction in the osteology of the skull in

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both articulated and disarticulated specimens (with which individual students are provided) is given. A careful basis for peripheral nerve injuries is laid in gross anatomy. The relationships of the parts of the nervous system are stressed and the sensory distribution of the peripheral system is emphasized. The eye and the ear are dissected in this course and the former again in the work in Microanatomy.

MICROANATOMY

(First Year, Trimesters 1 and 2)

In microanatomy the embryology of the nervous system is taught with a view toward correlating it with the subsequent course in neuroanatomy, but the ground is also laid for an understanding of congenital abnormalities and rests of possible neoplastic significance. In histology the morphologic characteristics of nervous tissue in general are considered, special neurological as well as general stains being employed and the special sense organs (including end-organs) are thoroughly gone over. An important feature of the work in microanatomy is an exegesis of the morphology and lineage of the neuroglia. The courses in gross anatomy and microanatomy occupy the first two trimesters of the freshman year.

PSYCHOPATHOLOGY

(First Year, Throughout)

Concurrently with the above mentioned courses and also during the third trimester, the Department of Neuropsychiatry conducts a course in psychopathology. Its specific aim is to elucidate personality functioning in terms of the whole organism rather than of the nervous system alone. Since, however, the nervous system in its known functioning more nearly represents personality activities than any other physiologic system does, this course may still be regarded as an approach to the nervous system. It is, however, an approach from another aspect, perhaps one should say, the opposite aspect from that which the student is simultaneously making in anatomy and physiology. Little attempt is made to correlate human behavior with functions of the nervous system *per se*, though, of course, organic deficiencies and disorders are pointed out as factors in disturbing the adjustment of the personality as a whole. During twenty-six hours of lectures and discussion, the fundamental conceptions of what might be called medical psychology are considered. Such concepts as dissociation, complexes, repression, displacement, projection, introjection and rationalization are presented and examined. Examples of behavior to which such terms have been applied are presented and the students are invited to express opinions as to whether the psychopathological formulations throw light on the behavior under consideration. A persistent effort is made to prevent the students from accepting, or from assuming that the instructor accepts, any schemata of interpretation as axiomatic truth by which conduct is necessarily to be explained and evaluated. The concepts are offered merely for what worth may be found in them when applied to the examples of human behavior presented for discussion. Every effort is made to furnish enough concrete examples and applications to make the student entirely familiar with what is meant by the concepts.

In choosing such examples a definite effort is made to begin with the ordinary behavior of people, behavior that has long been familiar to the students and daily seen by them. Other examples of behavior, which might be considered rather "queer" or "cranky," but which are rather obviously similar to what is accepted as normal, are offered and discussed in terms of mental mechanisms. The symptoms of the various psychoneuroses and, finally, of the psychoses are then examined, not as symptoms falling under a diagnostic term, but merely as observed samples of human reactivity. The same conceptions which were applied to the more ordinary and familiar reactions are applied to these more strange and confusing reactions. The application is always tentative, the students being invited merely to consider the interpretation and to accept the formulations of Psychopathology only insofar as they appear applicable or helpful in understanding the phenomena under consideration. Though the student is not asked to accept interpretations of dynamic psychology, he is required to familiarize himself with them and to discuss them, whether his position taken happens to be pro or con.

Throughout this course repeated attempts are made to stress a psychobiological viewpoint especially in regard to such terms as mind, psychogenic, functional, nervous condition, mental illness and psychosomatic. The student is invited to consider mind or personality not as a separate and hypothetical entity apart from the nervous system or of any bodily system, but as the expression of total functioning. Considerable emphasis is laid on this point of view since, to many students, such terms suggest some insubstantial effluvium vaguely conceived of as consisting in a sort of aureole or nimbus supposed to hover over the tangible body. Such conceptions, though resident in the student's mind, seldom command his real interest or belief. Consequently he is inclined to regard the problem of personality disorder as lying in a field closely related to theology or metaphysics and as not being real or practical. It is our belief that this total functioning, with its aims, its stimuli, its successes and its failures, cannot be honestly approached without admitting terms or ordinary human values and even of philosophical, esthetic and ethical criteria. An endeavor is made to stress persistently the fact that all such terms are highly colored with subjectivity and hence not to be regarded as final or scientific or even as reliably translatable. The approach to our problem from this viewpoint is free from any assumption that popular, or even century-worn, conceptions of right or wrong, beauty or ugliness, have universal validity. These conceptions enter the discussion merely as they are met in ordinary life and are treated as abstractions, phenomena which cannot be objectively weighed or measured but which still cannot be ignored since, in all their protean variations among people, they represent psychobiological activity and influence conduct. They are manifestations of the organism as a whole no less than toothache, a papular dermatitis or a urethral discharge are manifestations. No effort is made to attack or even to appraise in any sense but a medical sense; specific moral or religious ideologies are accepted as representing something. This may be far from what the possessor of the ideology thinks it is. Instead of a final truth or a supernal value one may be dealing with a prejudice or a symptom. But we cannot escape the fact that one is dealing with something, and with something related to causes and producing effects in the personality under consideration. The aim is to regard all the various and conflicting ideologies found among people as phenomena of life, to be interpreted and understood insofar as this is possible, like other manifestations of personality. So far as the psychobiological viewpoint is concerned these ideologies are taken as data or "findings" to be considered in relation to the person and his adjustment.

An earnest effort is made to keep the student alert to differences between objective facts of personality functioning, such as behavior, and non-objective phenomena such as the presumable emotion, intention, or cause that seems to lurk behind the behavior. Both are regarded as within the field of psychobiological study, but only the objective data can be taken as definitely factual. The other material, expressed purposes, unadmitted purposes, possible unconscious purposive tendencies, must be regarded as increasingly speculative and increasingly liable to subjective distortion on the part of the investigator. This is held, however, not as grounds for ignoring these all-important factors but as grounds insisting on

scrupulous attention to the point where the frankly objective merges with the more and more speculative. The importance of cumulative evidence in the non-demonstrable but interpretative aspects of personality-functioning is stressed; but the student is reminded that indications, even when strongly cumulative, can direct opinion only along a scale of increasing probability, never to technical certainty.

Personality study, being inevitably involved with matter which runs into fields of sociology, ethics, esthetics, and, in fact, into all aspects of human life and so-called values, cannot possibly be called an exact science; nor can any branch of medicine. Both medicine, as a whole, and its branch, psychiatry, can, however, be accurate in distinguishing between the purely objective data they deal with and the less and less objective data that they must deal with in no less sincerity. One need only go so far as to say that a patient is depressed, that another is indifferent, or still another uncomfortable, to be well out of the field where pure objectivity prevails. But medicine and psychiatry deal with the demonstrable and with the undemonstrable. They must retain insight and deal with each for what it is.

Repeated efforts are made to interpret various types of human behavior and human emotional reactions dynamically in general terms of purpose and striving toward comprehensible goals and efforts to avoid pain or shame. It is our belief that such discussions of personality functioning will help the student to see the pathological activities of the psychoneurotic and the psychotic when he meets them clinically, not as activities too bizarre, irrational and remote from ordinary life to be interesting, but instead, as distortions, often distortions based on cumulative, preceding, faulty reactions of comprehensible, and even in a sense, rational impulses.

Though time does not permit an extensive or minute examination of the psychoanalytical doctrines, an attempt is made to familiarize the student with the basic Freudian conceptions from which so much that goes to make up the diverse dynamic approaches to psychiatry apparently stems. The psychoanalytical interpretation of psychosexual development is discussed, though no effort is made to present it as final, demonstrable truth. Many examples of behavior are offered and the concepts of fixation and regression, of oral and anal tendencies, of unsuccessfully resolved Oedipus complexes are applied tentatively. The primary aim of such discussions is for the student to gain some clear idea of what such terms really mean and to believe in their validity insofar as he finds they explain conduct. Examples of behavior are drawn from experience with normal people, from clinical cases, and occasionally, from familiar characters in literature.

The differences of various schools of thought are mentioned but more attention is given the common ground. Such differences can often be presented as varied aspects of things essentially similar, as in the simple example of what the psychoanalyst would call transference, and the behaviorist, a reactivation of an old conditioning by a stimulus closely enough associated to act as the earlier signal did.

During the course, which extends almost entirely through the freshman year, each student is required to make a written personality-study of himself. The class-room discussions of varied types of human behavior and varied interpretations, are designed to help the student to approach himself with more insight in this task and not to be frightened even when facing facts about himself heretofore denied or shunned. These papers which run to sixty or seventy pages of type-written copy show earnest effort and enheartening insight in most of the students.

It is the hope of the department of psychiatry that each student will gain a clearer and more convincing knowledge of irrationality in ordinary life, of factors which disturb insight, and that he will no longer feel himself baffled with paradox or moved to rage when he finds patients unaware of what they are purposefully doing and unaware of the motives which drive them.

NEUROANATOMY (First Year, Third Trimester)

The course in neuroanatomy occupies the last trimester of the first year. It is begun by a very brief review of those phases of the nervous system already covered and then concerns itself, during a period of three weeks, with the macroscopic anatomy of the central portion of the system. It has been found imprudent to begin instruction by the use of the microscopic sections, and during these early weeks the students deal with macroscopic preparations only. This produces general concepts with clear ideas upon the relative position and size of structures subsequently studied in detail. There is no introduction of physiological considerations thus far. Rather the work concentrates upon an attempt to fix general anatomical considerations in the student's mind. The meninges and angiology, as well as the skeletal protection of the system are considered in detail. As this work proceeds the gross material is completely dissected, being finally worked down to the hand lens stage. A review of the parts, by means of gross cross-sections, is then rapidly pursued and an examination given.

The second part of the course in neuroanatomy is concerned with histological study and physiological concepts. The first four weeks are concerned with an ascending regional study. The student is provided with both Nissl and Weigert sections of each segment of the spinal cord and with Nissl and Weigert sections at each of 75 levels of the brain stem. Special cerebellar and cortical slides, done both by the Nissl and Weigert methods as well as silver and other techniques employed by the neuropathologist, are provided. Each student has a set of slides demonstrating tracts of the spinal cord by experimental degeneration methods.

The third part of the course, taking advantage of the static microneuroanatomic information recently acquired, seeks to transform this into physiologic patterns. The chief neurophysiologic functions are gone over and parts formerly static are now welded into dynamic systems. No attempt is made to discuss pathologic considerations in this course except insofar as they are peculiarly illustrative of anatomic and physiologic considerations.

NEUROPHYSIOLOGY, NEUROPATHOLOGY AND NEUROLOGICAL PHYSICAL DIAGNOSIS (Third Trimester of First Year and Second Year Throughout)

In the first trimester of the second year the physiology of the nervous system is further considered under the auspices of the Department of Physiology. Emphasis is now again placed upon the organism as a whole in which the nervous system is considered as an active but by no means the most important portion. Throughout the second year instruction in pathology is pursued and there is a general introduction to neuropathology. During the third trimester a portion of the course in physical diagnosis is set apart for neurologic physical diagnosis which is taught by the Department of Neurosurgery.

The student finishes the first year with a compound mass of anatomical facts. These facts are easily forgotten unless connected by physiological and physiopathological mechanisms associated with clinical pictures. It is the purpose of the class in neurological physical diagnosis to accomplish just this in the eleven hours devoted to it in the last trimester of the second year. The student is drilled on the segmental patterns of the neuraxis and how these patterns are connected in a unit with the peripheral mechanisms and the suprasegmental structures. The sympathetic system is then woven into this pattern and the physiological functions of the whole are then discussed. Hence, the student pictures the workings of each unit, starting from the pure Sherrington reflex of reciprocal innervation and going through the sympathetic and parasympathetic reflex mechanism of the bladder and rectum. This is then compiled into total function of the organism.

The neurological examination is taken up step-by-step with reference to the physiological-pathology of its signs and symptoms. During this procedure the students are encouraged to ask and answer their own questions by reasoning along the lines of anatomy and physiology. Clinical cases are brought in and the signs and symptoms demonstrated are discussed, as at a round table, in order to stimulate the interest of the student. Lantern slides, motion pictures and physiological charts are used to demonstrate various points of physiologic interest. This introduction prepares the student for his course in Neurology and preserves his knowledge of neuroanatomy.

DIDACTIC NEUROLOGY AND NEUROSURGERY. NEURAL CLINIC
(Third Year, Throughout)

During the third year a didactic course is offered in clinical neurology. On the background of neuroanatomy, neurophysiology, neuropathology and their course in the neurological examination the students now study an orthodox textbook on diseases of the nervous system. Forty-four hours are devoted to lectures, classroom discussion and quizzes. Though the bulk of this time is devoted to organic disorders, the psychoneuroses are also assigned for reading and discussed briefly in class. At this time an effort is made to bring together the student's earlier work in psychopathology with his knowledge of the nervous system. The general problems of psychosomatic disorders are considered and a very brief account is offered of the major psychoses. Frequently patients are brought into the classroom to illustrate concretely the symptoms and signs of the disorders which the students are studying.

During this course each student spends two hours or more per week, for a term of eleven weeks, in the clinic conducted by the Departments of Neurosurgery and Neuropsychiatry. Here the third-year student is confronted with the neurological and psychiatric problems of general practice. He learns to differentiate between cases that are psychiatric and those that can be helped by medical neurology and surgery. He is taught that the three are blended together and hard to separate. He refers his cases to the hospital and often follows them to the operating room and back to the clinic for examination. Under supervision, he takes psychiatric histories and makes neurological and psychiatric examinations on patients. He also has the opportunity to be present when psychometric examinations are conducted and occasionally to carry them out himself. At this clinic the students are taught the technique of lumbar puncture and alcohol injection and each student carries out at least one lumbar puncture under close supervision. In addition to the usual cases of organic neurological disease,

psychoneuroses and psychoses, the student has the opportunity to study a number of behavior problems in children brought for psychiatric study and guidance by the local Juvenile Court. A member of the Department of Pediatrics works with the Department of Psychiatry in the Outpatient Clinic and collaborates in this work.

During the last trimester of the third year, for twenty-two hours, a didactic course in neurological surgery is offered. It is not the intention of the Department of Neurosurgery to produce neurosurgeons. It is our purpose, however, to acquaint the man who is going to do medicine and surgery, in small towns, with the possibilities and heartaches of Neurological Surgery. He is fully prepared to recognize any neurological manifestation that may be corrected by surgery. He is prepared to discuss the prognosis with the family. Because of the increasing importance of adequate care for craniospinal trauma, by the surgeon, in small communities, special emphasis is placed upon this subject. The pathology of cerebrospinal trauma is discussed in detail and the physiological changes produced by this pathology is correlated with what help can be offered by surgery or conservative treatment. The diagnosis of non-specific brain and spinal cord tumors is dealt with. The signs and symptoms that should make one suspect a tumor are given; what procedures are undertaken to prove its presence are explained. The mechanisms of physiological surgery are discussed and the efficacy of the procedure evaluated. No attempt is made to teach neurosurgical technique, but pictures of operations are presented to demonstrate possibilities and prognoses. Patients are presented before and after operation so that the student can evaluate, for himself, how the diagnosis is made and what to expect.

CLINICAL WORK IN THE SENIOR YEAR

During the senior year students have thirty-three hours devoted to formal clinics and lectures in neurology and thirty-three more to psychiatry in addition to their activities in neurosurgery. The neurology consists chiefly of the presentation of neurological cases which the student has previously worked up on the wards. In discussions of these cases the didactic work of the previous years is reviewed and the information applied to specific cases. The students not only take histories and make complete neurological examinations of the patients assigned to them on the wards but also follow the treatment and progress of the cases. The student observes the making of encephalograms, attempts to interpret them, carries out visual field studies on the Bjerrum screen and is encouraged in careful audiometric examinations.

In the psychiatric clinics and lectures a formal presentation is made of the psychoses, the psychoneuroses, mental deficiency, psychopathic personalities and other personality maladjustments. In addition to his first year's work in psychopathology the student has already gained a slight familiarity with clinical psychiatry during his third-year course in neurology and at the neural clinic. Cases of the personality disorders are worked up on the wards, psychiatric histories and psychiatric examinations being made by the student. These cases are presented at the clinics and discussed in detail.

Special current types of therapy such as, at present, metrazol, insulin, prolonged narcosis (*Dauerschlaf*), nitrogen inhalation, and malaria are seen by the students who follow each case and make daily progress notes. The psychiatric and neurological cases are treated on the general medical wards. Occasionally, when psychotic patients become disturbed, it is necessary to remove them to separate quarters and to provide more careful supervision. Usually little difficulty is experienced in keeping even frankly psychotic patients in the general hospital pending improvement sufficient for them to be returned home, or, if they fail to improve, transfer to the State Hospital.

A lecture course of eleven hours in pediatric psychiatry is also given in the fourth year. This is conducted by the same instructor, from the Department of Pediatrics, who works in the outpatient neural clinic and who maintains close cooperation with the Department of Neuropsychiatry. Many practical problems in the personality adjustment of children are presented and the student is invited to consider the possible relation of those early and relatively mild deviations and the influences which bring them about, with the psychoneuroses and psychoses as seen in adults.

In addition to the psychiatric patients seen at the University Hospital the students are given an opportunity to observe many others at the Veterans Administration Hospital, a neuropsychiatric institution located only four miles from the medical school. During the fourth-year course in psychiatry twelve clinics are held at the Veterans Hospital. Patients illustrating a wide variety of reaction types are presented, and the student has an opportunity to familiarize himself with psychotic patients in large groups and to observe the organization and general functioning of a modern neuropsychiatric hospital. The Veterans Hospital has over eleven hundred beds. Plans and procedures in physiotherapy and occupational therapy, which are extensively practiced at this institution, are demonstrated to the students and discussed.

During the senior year, moreover, all students spend three days at the State Hospital in Milledgeville, Georgia. Here, in addition to attending organized clinics where large numbers of typical and atypical cases of psychiatric disorders are presented and discussed, the student spends many hours on the wards among more than seven thousand patients under treatment at the State Hospital, and sees psychoses in widely varied manifestations. At the State Hospital the students attend staff meetings and note points on which diagnoses are made and treatment determined.

The aim of the Department of Neuropsychiatry is not to present a sharply separate picture of human illness at the personality level, but, in stressing the viewpoint of illness at this level, to keep always in mind the interrelation and interdependence of personality with other factors. These other factors, which might be distinguished as those which primarily affect specific systems or organs, fall into the closely related and sometimes scarcely distinguishable field of neurology or into the slightly less intimate fields of internal medicine, surgery and the special branches of medicine. The importance of conditions affecting parts of

the body in the general picture of personality functioning is maintained no less than the importance of personality difficulties on the part-functioning.

The fourth-year work in neurosurgery is entirely clinical and is in the form of ward-rounds and conferences. The students are assigned cases as they are admitted to the wards and here they complete the study under the guidance of the resident staff. The student presents his case to the clinical conference with his diagnosis and recommendations. At these conferences the Departments of Neuropsychiatry, Neuroanatomy, Neuropathology and the resident staff are present and a rich discussion is offered. The student then follows his case to the operating room, assists in the operation and follows closely the after-care. We wish to stress, at this point, the close collaboration between the entwined departments in the diagnosis and care of neurosurgical cases. These cases are given the benefit of many opinions before surgery is undertaken and the student quickly realizes the importance of this. We wish to state that neurosurgery as taught in this school is an integral part of neurology and psychiatry, founded on neuroanatomy, neurophysiology and neuropathology and dependent upon medicine, clinical pathology and roentgenology.

Neuropsychiatric teaching has, under this plan, been intimately dependent on the cooperation of all other departments in the Medical School. This cooperation has been given enthusiastically and without stint. Specific examples of collaboration may be cited in: (1) members of the Departments of Neurosurgery and Neuropsychiatry being given the opportunity to act as assistants in the first year course in neuroanatomy; (2) members of the Departments of Neuroanatomy and Neurosurgery attending the fourth year clinics in neurology; (3) ward rounds and examinations made jointly by the men who teach neuroanatomy, neurosurgery and neuropsychiatry; (4) regular attendance of the Neuropsychiatric Department on the daily ward rounds made by the professor of internal medicine and his staff; (5) the aid of the Department of Anesthesia in planning resuscitatory measures for emergencies arising in metrazol therapy of the psychoses; (6) the application by the Department of Internal Medicine of new work in the avitaminoses to psychiatric problems with most encouraging and stimulating results; (7) the encouragement offered to the Department of Neuropsychiatry and Neurosurgery by the preclinical departments to work in their laboratories; experimental work on animals undertaken in collaboration between clinical and preclinical men interested in the nervous system and preclinical men invited to help solve clinical problems that arise on the ward; (8) the alertness of the Department of Surgery to possible neuropsychiatric factors in complaints that seem to indicate operation and its unfailing cooperation in joint efforts to arrive at wise decisions in such problems; (9) the hearty cooperation of the Department of Pediatrics in the study and treatment of behavior problems. This happy interworking of various departments has been of inexpressible value in approaching the nervous system from a teaching viewpoint, and, we believe, a great advantage in dealing with the difficult problems of neurological and personality disorder.

The interns, the students and resident staff often have the opportunity of

observing the viewpoints of internal medicine, of neurosurgery, of biochemistry, (which department is closely linked with that of medicine), of psychiatry and of neuroanatomy, neurophysiology or neuropathology on some specific patient and his specific problems. Differences of opinion are not only inevitable but encouraged. We have emphasized how these are utilized to build up the student's confidence in his own ability to reason and to develop in him an attitude of tolerance and respect for ideas which conflict with his own. Moreover, in the discussion which often arises, the representatives of each department are bound to gain something in knowledge and, perhaps, more important, to lose a little of that isolation and limiting complacency that sometimes come to the specialist in any line of endeavor. The students appear to benefit by such discussions and a real enthusiasm for the problems of the nervous system and of the personality is not infrequently seen. We have had the satisfaction of observing a few graduates develop a taste for this type of work and express a desire to undertake, at the larger centers, postgraduate training in the field.

One very cheering example of the student's response to the four year correlative teaching plan for the nervous system may be cited. Last year the third year class, after completing its regular fifty-four hours of required classroom work in neurology, spontaneously requested to be met once a week during the last term. This voluntary class was faithfully attended. When one considers the heavy schedule of didactic work carried by our third year students, the sincerity of their interest in the nervous system becomes manifest. This interest, we believe, is not due to any one course or any particular instructor but to the cooperative efforts of the concerned departments in keeping the nervous system before the students as a vivid and challenging problem and one which runs through the whole of medicine.

In conclusion, it should be emphasized that we have avoided any attempt to produce specialists in a restricted field. We have been at considerable pains to point out limitations of knowledge and to differentiate between degrees of relative certainty and importance. Our purpose has been to produce sensible general practitioners who, while not confounded by the nervous system, will be comparatively immune to faddism.

The Influence of Color and Form Vision on the Progress of Medical Students in Microscopic Anatomy: Implications in Medical Education*

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The microscope is an indispensable aid in the study of medicine. It is an absolute necessity in the study of histology, organology, neurology, pathology, bacteriology and clinical pathology. In all these courses, color is a more or less vital component. Furthermore, many clinical and laboratory tests use colored solutions for diagnostic purposes. Color very often accompanies disease manifestations, such as redness in inflammatory conditions and blueness in cynosis.

A careful survey of the literature reveals that very little interest has ever been shown in the application of color vision to the study and practice of medicine. Unless I have overlooked some articles in a review of the literature, the present study constitutes the third effort in this field.

The medical student and his qualifications for the study of medicine is a matter of growing interest in medical education. Medical educators have realized the importance of selecting a higher type student for the study of medicine. This important movement is yet in its infancy. Interest has been limited mainly to intelligence tests, aptitude tests and scholastic achievements. It is only natural that these phases should be the first to receive consideration.

So far as I know, Tocantins and Jones¹ and Macklin² are the only investigators who have studied the effect of color vision on the work of medical students. Tocantins and Jones' studies concerned especially the clinical aspects. They gave the Ishihara color blind test to seventy members of the junior class at the Jefferson Medical College. They reported nine out of the seventy to be seriously color defective, which gives a 12.8 per cent color blindness. Further study was limited to these nine defectives, using nine normals as controls.

These nine color blind students were asked to perform certain practical laboratory tests, such as the titration of unknown acid mixtures, using phenol-sulphonaphthalein as an indicator; the identification of gram-negative and gram-positive organisms; the description of acid-fast organisms in stained preparations; the identification of polymorphonuclear leukocytes in blood smears and the making of spectroscopic determinations.

These tests were either failed completely or were passed with great difficulty by all nine color blind subjects. When questioned regarding any difficulties they had experienced with colors during their medical work, they explained that they

*This paper is a revision of a dissertation presented for the degree of Doctor of Philosophy in the University of Kansas.

1. Tocantins, L. M. and Jones, H. W.: Defective Color Vision and its Handicaps in Medicine. *Amer. J. M. Sci.* 85:243-249, 1933.

2. Macklin, M. T.: Color Sensitivity in Medical Students. *Canad. M. Asso. J.* 29:302-303, 1933.

had found it difficult to detect certain skin lesions; to differentiate between scarlet fever with rash and cyanotic conditions; to make hemoglobin determinations; to identify the tubercle bacillus; to distinguish the differential staining reactions of erythrocytes in pernicious anemia and to make colored drawings in anatomy.

Macklin, stimulated by the work of Tocantins and Jones, gave the Ishihara test to 125 medical students, presumably at the University of Western Ontario Medical School, London, Ontario. She reports an incidence of 11 per cent color blindness. Her findings, in general, confirm those of Tocantins and Jones.

METHOD OF INVESTIGATION WITH EVALUATION OF TESTS USED

Color vision tests were given to the freshman medical students at the University of Kansas during the years 1933 to 1939, and to the freshman medical students at the University of Arkansas during the year 1938-1939. Four hundred and thirty-two students were used for this investigation. The following color perception tests were used: The Ishihara color blind test; the Nagel color blind plates; the Eldridge-Green color perception lantern and a color vision scale constructed by me. All four tests were not employed in testing any given student. But, with the exception of fifty students, at least two tests were used, one, in every case, being the Ishihara test.

The Nagel color blind test and the Eldridge-Green lantern are tests which might well be characterized as purely color tests. In my opinion, they measure the ability of the individual tested to perceive color per se. Form perception is not involved.

The Ishihara test and my test, due to their mode of construction, demand that the subject be able to perceive "form-in-color," and not just color. Both tests are so constructed that the subject must read a number formed from colored dots placed upon a field of differently colored dots. Unless the subject is able to organize the colored dots into a recognizable number, the tests cannot be passed as normal. This adds to the complexity of the perceptual process.

The Ishihara test is recognized by most authorities as being one of the best color blind tests available. Onfray and Petit³ believe that it gives the most certain and most reliable results as well as a better differentiation of the various degrees of chromatic deficiency. It is a very easy and convenient test to use. Furthermore, it is very certain to detect genuine color blindness. If used skillfully, it will reveal degrees of color weakness. However, its weakness lies in the fact that it does not discriminate between those individuals who are color blind per se, and those who are unable to pass the test because they cannot interpret the formed numbers in spite of the fact that they can accurately perceive the colors composing these numbers. I have found that these two processes are not identical. The latter is a more highly structured mental process which is probably dependent on the psychophysical constitution of the individual.

Many individuals were encountered during a survey study conducted by me of 3,000 University of Kansas students who tested red-green blind when the

3. Onfray, R. and Petit, P. J.: *Chromatisme et Sécurité Les Tables d' Ishihara*. Ann. Oculist, Paris, 172:213-221, 1935.

Ishihara test was used, but who tested very well in the normal range with the Nagel test. These particular individuals were able to select accurately the various colored dots composing the Ishihara test, although they were unable to read the number which these dots formed. When instructed to point out in consecutive order the dots making up any given number, for example a "2," they would usually exclaim, on completion of the task, "Well! I traced out a '2', but I don't see it." I find it very difficult to call such individuals color blind, in spite of the Ishihara plates. I favor the interpretation that they lack the ability to organize the sensory components into a recognizable unit. This would explain their apparent inability to perceive the numbers, although the colors were perceived clearly and accurately. A more descriptive term for these people would be "color-form" blindness, by which is meant the inability to perceive form when combined with certain colors. Certainly, this interpretation is not in disagreement with the work being done in the relation of color and form to personality types, such as the psychological types of Kretschmer, Jaensch and Rorschach.

A study of stained histological preparations demands the ability to perceive the "color-form" complex. It is for this reason that I selected these two types of tests for the present study.

A total of 432 medical students were carefully examined. The nature of the responses, the time required to make the responses, and the number of times any mistake had to be repeated before being corrected, if corrected, were observed. From this information each student was placed in a "color-form" class, arbitrarily established. This system of classification was based partly on personal experience in color testing, and partly on the system of classification established by Terman.⁴ It is as follows:

Class 1.—Good color-form perception. This group includes those students who experienced little, if any, difficulty in perceiving correctly either color or color-form.

Class 2.—Weak color-form perception. This group represents those students who (1) made three or four errors on the tests, responded slowly, required more than two repetitions for correction; (2) who made from four to six errors; or (3) who made six or seven errors but corrected them within three trials.

Class 3.—Defective color-form perception. This group contains those students (1) who made six or seven errors, responded slowly, required more than three repetitions for correction; (2) who made from seven to nine errors; or (3) who made 10 or 11 errors but partially corrected them within three trials.

Class 4.—Blind Color-form perception. This group includes those students who tested either red-green blind or who were unable to perceive correctly color-form.

These classified groups are purely relative, qualitative in nature and subjec-

4. Terman, S. W.: A New Classification of the Red-Green Color Blind. *Amer. J. Psychol.*, 41:237-251, 1929.

tively derived and consequently subject to error. But since no objective means of measuring degrees of color sensitivity were available, this recourse had to be taken.

Out of the 432 cases studied, 211, or 48.8 per cent, were placed in class 1; 132, or 30.78 per cent, were placed in class 2; 52, or 12.03 per cent, qualified for class 3; 36, or 8.33 per cent, were entered in class 4.

Having classified each student, the official grade books of the departments of anatomy were obtained. All grades representing laboratory practical examinations in histology and organology involving the use of the microscope were used. All grades resulting from oral and written examinations were excluded for the reason that such examinations are based largely on textbook material which is uninfluenced by color-form. The number of grades recorded for each student ranged between 9 and 22, with an average of 16.4. This number is sufficient to determine the progress each student made. With few exceptions the slides used for these examinations were hematoxylin and eosin preparations, similar, if not identical, to the slides used by the students in their daily laboratory study.

Inasmuch as these accumulated grades represent a period of several years and extend to two schools, it is apparent that no one instructor is responsible for all the grades. Therefore, any irregularities in grading resulting from an instructor's work would be minimized by the grading of the other instructors. The grades for each student were arranged in the same order in which the examinations were given. Each series was divided in two groups, and the subdivisions averaged and the difference between these averages was considered to be the number of points numerical progress made by the student.

It is reasonable to assume that the numerical progress of a student is not a fair index of his relative progress as compared to the total group. This assumption is founded on the logic that it is more difficult to raise a high grade to a higher level, than a low grade to an average level. Believing that the percentage progress represents a more accurate comparative measurement, I adopted it for this study. Accordingly, all numerical progresses were converted into percentage progresses by subtracting the average of the first half of each series from 100. This gave the exact number of points each student would have to progress numerically in order to attain a perfect score. The percentage progress was then found by dividing this value into the actual numerical progress attained by each student.

The average percentage progress for each color-form class was then determined. With these values at hand further treatment of the data consisted, statistically, in determining the standard deviation, the coefficient of variation and the critical ratios.

The final average grades for the various color-form classes were compared to determine what relationship, if any, existed between color-form sensitivity and the average final numerical grade.

RESULTS

Table 1 gives the percentage progress, the standard deviation, and the coefficient of variation for the various color-form classes. A study of this table will

show that a considerable difference exists between the four color-form classes as to the percentage progress made on the series of laboratory practical examinations. The good color-form class made an average percentage progress of 49.7 ± 0.73 . The range for this group extended from 0 to 86.1 per cent. The weak color-form group made an average percentage progress of 30.5 ± 0.43 , with a range extending from 8 to 49 per cent. The difference between the averages of these two classes was 19.2 per cent in favor of the good class.

TABLE 1.—STATISTICAL DATA FOR THE COLOR-FORM CLASSES

Classification	Mean percentage progress	Standard deviation	Coefficient of Variation
Good color-form	49.7 ± 0.73	15.82 ± 0.25	31.8 ± 1.15
Weak color-form	30.5 ± 0.43	7.38 ± 0.31	24.18 ± 1.06
Defective color-form	10.6 ± 0.75	8.04 ± 0.53	75.8 ± 7.85
Blind color-form	46.4 ± 1.31	11.64 ± 0.92	25.08 ± 0.25

The average percentage progress for the defective color-form class is 10.6 ± 0.75 . The range extends from 0 to 33.3 per cent. The difference between the averages of this class and the weak class is 19.9 per cent in favor of the weak class.

The average percentage progress of the blind color-form class is 46.4 ± 1.31 . The range varies from 28.4 to 69.5 per cent. The difference between the averages of this class and the defective class is 36.0 per cent in favor of the blind class. This is an interesting finding since it favors the most defective group rather than the better group, as before.

TABLE 2.—SIGNIFICANT RATIOS FOR THE COLOR-FORM CLASSES

Classification	Significant ratio
Good color-form Weak color-form	22.66
Weak color-form Defective color-form	23.02
Blind color-form Defective color-form	23.19
Good color-form Defective color-form	37.36
Good color-form Blind color-form	2.20
Blind color-form Weak color-form	11.53

A study of tables 2 and 3 will show that the differences in the amount of percentage progress between these color-form classes are significant. The critical ratio between the good and the weak color-form classes is 22.66. That between the weak and the defective classes is 23.02. While that between the defective and the blind color-form classes is 23.19. When one considers that any ratio greater than 3 is statistically significant, then these very large ratios are significant. One is accordingly forced to the conclusion that color and form play an important part in the progress of medical students in work involving the use of the microscope.

Table 3 contains the same data found in table 2, but expressed in terms of comparisons between percentages rather than between critical ratios. For this reason one is able to grasp more readily the significant differences.

The students were divided into four groups on the basis of percentage progress. Those individuals whose progress ranged between 0 and 19.9 per cent were considered as having made only "slight progress." Those students whose progress ranged between 20 and 39.9 per cent were classed as "fair progress." Those whose progress ranged between 40 and 59.9 per cent were placed in the "good progress" class. Those students who achieved above 60 per cent were considered as having made "excellent progress."

TABLE 3.—COMPARISON OF COLOR-FORM SENSITIVITY WITH PERCENTAGE PROGRESS

Slight progress 0.0% to 19.9%	{	Good color-form	6.6%
		Weak color-form	7.6%
		Defective color-form	94.2%
		Blind color-form	0.0%
Fair progress 20.0% to 39.9%	{	Good color-form	8.5%
		Weak color-form	83.3%
		Defective color-form	5.8%
		Blind color-form	33.3%
Good progress 40.0% to 59.9%	{	Good color-form	62.2%
		Weak color-form	9.0%
		Defective color-form	0.0%
		Blind color-form	52.7%
Excellent progress 60.0% to 100%	{	Good color-form	22.7%
		Weak color-form	0.0%
		Defective color-form	0.0%
		Blind color-form	14.0%

A study of table 3 will reveal that among the slight progress group, 94.2 per cent were defective in color-form. Among the fair progress students, 83.3 per cent were weak in color-form. While among those who achieved good and excellent progress, 84.9 per cent were good in color-form. The color-form blind students ranked mostly as fair and good progress.

It is very apparent that the degree of progress is directly proportional to the degree of color-form sensitivity until the blind color-form class is reached. Then the curve rises rapidly and approximates the level of the good color-form class. This is graphically represented in figure 1. The reason for this occurrence will be found in the following section on the discussion and interpretation of results.

TABLE 4.—COMPARISON OF AVERAGE GRADES WITH COLOR-FORM CLASSES*

Classification	Percentage difference
Good color-form vs. Weak color-form	1.39% less
Good color-form vs. Defective color-form	4.77% less
Good color-form vs. Blind color-form	2.64% less
Weak color-form vs. Defective color-form	0.94% less
Weak color-form vs. Blind color-form	1.26% less
Defective color-form vs. Blind color-form	2.18% less

*The difference between the two groups compared is always in favor of the first group.

A study of table 4 will show that as regards the final average grade no difference greater than 4.77 per cent exists between the various color-form classes. Such a small difference probably carries little significance, and might well be due to chance factors or to normal variability.

It seems necessary to conclude from these findings that little, if any, positive correlation exists between color-form sensitivity and numerical grades. However, an inspection of table 5, which shows a comparison between color-form sensi-

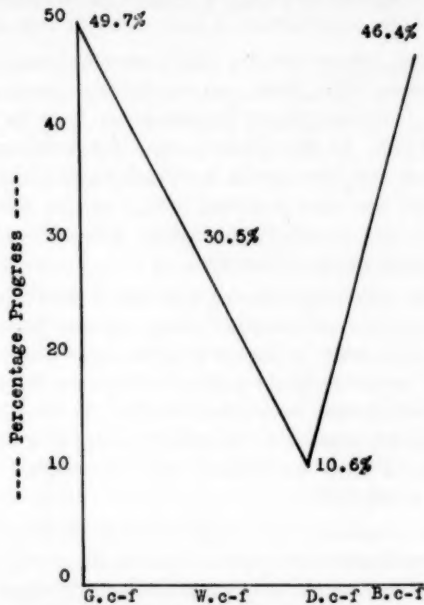


FIG. 1.—Graphic representation of percentage progress. G. c-f: Good color-form; W. c-f: Weak color-form; D. c-f: Defective color-form; B. c-f: Blind color-form.

tivity and numerical grades translated into class ratings, will show that there is a tendency for more of the poorer students to be found in the weak and defective color-form classes, while more of the better students are found in the good and

TABLE 5.—COMPARISON OF COLOR-FORM SENSITIVITY WITH SCHOLASTIC RATINGS

Good color-form	{	Good students	39.3%
		Average students	47.3%
		Poor Students	12.9%
Weak color-form	{	Good students	25.0%
		Average students	50.0%
		Poor students	25.0%
Defective color-form	{	Good students	23.8%
		Average students	40.4%
		Poor students	30.8%
Blind color-form	{	Good students	22.2%
		Average students	61.3%
		Poor students	16.4%

Students whose final average grade lies between 80 and 100 are classed as "good students." Students whose final average grade lies between 70 and 80 are classed as "average students." Students whose final average grade lies below 70 are classed as "poor students."

blind color-form classes. The question is whether or not this tendency is great enough to be considered significant.

DISCUSSION AND INTERPRETATION OF RESULTS

The perception of color and form seemingly are two very important variables in the study of histology. They apparently influence to a very considerable extent the success any given student will have in recognizing and identifying the various tissue elements and the organization of these elements into tissues and organs.

Every histological preparation is a highly complex structure. The tissue is composed of numerous cells, fibers and intercellular matrices organized into complex patterns. It is this pattern formation—or form quality—which gives to any tissue its identity. In the unstained state, due to the indices of refraction of the tissue elements, this form quality is difficult to see. Therefore, in order to aid in its perception, the tissue is stained with a specific biological stain. The most common technique employed for routine preparations is to stain with hematoxylin and counterstain with eosin.

Due partly to the differential staining reactions of the various tissue elements, and partly to irregularities of technical procedure, any given hematoxylin and eosin preparation will present to the eye a multicolored picture. Critical inspection will reveal an almost unlimited gradation of various hues, tints, shades and saturations, all of which must be perceived in relation to each other before the true nature of the preparation can be appreciated fully. It is well known in color perception that the value any specific color may have depends on its relation to other colors in the visual field.

Staining a tissue preparation materially increases the definition of its formed elements. It does vastly more than this. It establishes a very complex situation involving both color and form, a situation psychologically more complex than the average student of the microscope realizes. It creates a "color-form complex," in which the accuracy of perceiving the form will depend on the perception of the color. Many investigators have demonstrated the interdependence of color and form.

From this it follows that before one can fully appreciate and understand the structure of a tissue preparation, there first must be a reasonably accurate perception of the color values which have been superimposed upon it.

The perception of color per se is dependent on several important variables, four of which will receive immediate consideration inasmuch as they are pertinent to microscopic work. These are (1) the intensity of the stimulus pattern, by which is meant the energy value of the light present in the stimulating object; (2) the physical organization—structure—of the stimulus pattern; (3) the sensitivity of the perceiving individual to light, and (4) the sensitivity of the perceiving individual to color.

The perception of color in its true value is a function of the quantity and quality of the light present, both in the color itself and in the surrounding field. This has been demonstrated so many times that citations need not be offered here. Any given color of a definite hue and saturation can be transformed into an entirely different hue and saturation merely by increasing or decreasing the intensity of the light.

The importance of the relationship between color and intensity to the use of the microscope should be quite clear. The source of the illumination, its quantity and quality, and the amount of light penetrating the tissue will govern the color values of the stained elements. This, in turn, will influence the interpretation placed on the slide.

Fortunately, microscopes are equipped with iris diaphragms so that each student can adjust the light to his best advantage. However, even here the instructor in histology too often forces on the beginning student his own judgment as to the amount of light to be used, and very frequently to the disadvantage of the student. This well intended gesture on the part of the instructor is executed without realizing that no two individuals require exactly the same amount of light to gain an equal definition. Katz⁵, one of the foremost authorities on color vision writes: "Every one knows from his own experience that there is for the eye a degree of illumination in which he sees most distinctly, distinguishes objects with least difficulty, and perceives most details in them, and that any illumination falling considerably below or rising considerably above this optimum reduces markedly the distinctness of vision." There is an "optimum illumination" for each student, and only the student can set its limits. Consequently, the instructor's standard of illumination will frequently be unsatisfactory for the student. The student should be informed as to the importance of proper lighting and how to regulate it on his microscope. But the exact amount of light to be used should be determined by each individual student.

The second variable in the perception of color pertains to the structure of the stimulus pattern. By this is meant the spatial relationships which exists between and among the elements which make up the stimulus pattern. These spatial relationships will influence materially the colors which are seen. The more clearly defined these relationships are, the more specific the colors will be.

A tissue preparation is a complex structure with a superstructure of color added to it. Therefore, we can expect that the sharpness of differentiation among the tissue elements will influence the color values of the slide as well as the colors influencing the differentiation of the structure.

The importance of this structure-color relationship in the use of the microscope deserves attention. The appreciation of the tissue depends on an appreciation of the color values present. The appreciation of the colors will be influenced by the structures in which these colors appear. The sharper the definition among the formed elements the stronger will be the color presentations. Sharpness of definition of a histological preparation will depend on such technical procedures as fixations, staining, dehydration and clearing of the tissue. If these are carried out properly, the formed elements will be sharply set off from the background. This sharpness of differentiation will enhance the color values. This will facilitate color preception and thereby increase the possibility of greater appreciation for the slide.

5. Katz, D.: *The World of Color*, Kegan Paul, Trench, Trubner and Co., Ltd. London, 1935.

The third variable in color perception, namely the sensitivity of the perceiving individual to intensity changes, is more important in microscopic work than might at first be realized. I have found that a given source of light as viewed through the microscope did not have the same subjective intensity value when judged by various individuals. The range of variation was surprisingly great. A given source of light which would be too intense for sharp definition by one individual proved to be insufficient for accurate observation by another.

The significance of this subjective factor must be appreciated. It means that any given hue and intensity will appear quite different to different individuals, even though the physical stimulus remains constant. Therefore, it follows that the discrimination of color and form will vary from individual to individual. Hence, any given histological detail will appear different to various students, enough so that some will see it easily and accurately, some only with difficulty and distortion, while some may never be able to see it. Repeated observations have convinced the writer that this is true.

The fourth variable, the sensitivity of the perceiving individual to color, is of paramount importance. The dichotomy of the normal and the color blind is somewhat misleading. All trichromats do not exhibit equal color sensitivity, and there is not a sharp line of demarcation between them and the color blind. There is, on the contrary, a continuous gradation in color sensitivity which extends from those who perceive all colors in their true values to those who perceive the spectrum only as variations of gray.

When we take cognizance of the fact that even the so-called normals exhibit a great range of color sensitivity and will, accordingly, judge a given colored stimulus as being of a different wave length than it actually is, we gain further insight into the problem of color vision and the interpretation of microscopic structure.

At the beginning of a course in histology, and on the first one or two practical examinations, each student will make a certain numerical grade. This grade will be conditioned by a number of factors, part of which will be purely chance factors. However, the extent to which each student succeeds in elevating this grade level during succeeding examinations will depend largely on his ability to appreciate the tissue elements in their relationship to each other. The ability thus to perceive this organization will vary with the sensitivity of the student to color and form.

Those students who are fortunate enough to be relatively free from such perceptual defects will, other things being equal, have little, if any, difficulty in seeing and understanding tissue-element relationships. Hence, they will learn to differentiate easily and readily the various tissues and organs. These individuals, who will represent roughly 50 per cent of any class, will require very little assistance in the laboratory. They will profit quickly and permanently from whatever aid they receive. Furthermore, they can be expected to make an average progress of approximately 50 per cent, with considerable individual variation.

Those individuals with slight perceptual defects, who will constitute roughly 30 per cent of any class, will experience a certain amount of difficulty with their slides. Often they will not be able to see and appreciate clearly certain details which they are asked to observe. This apparent inability will be due to either minor color confusions which will blur or obliterate the details, or to the persistence of a dominant regard for color over form which will momentarily obscure the detailed structures, or arrest their ascent.

In either case, the results to the student will be the same. He will not be able to appreciate the slide in its completeness until the instructor points out to him the confusing elements. The ease and readiness with which a given student responds to such assistance will depend largely on the seriousness of his perceptual defect. Likewise, the percentage progress he achieves will be governed by his perceptual sensitivity. Other factors remaining constant, he will probably progress to the extent of about 30 per cent. These students will require much more of the instructor's time than will those of the good color-form class. However, the results obtained will very well justify the time and effort spent by the instructors.

From the point of view of progress achieved, the most unfortunate students are those who are defective in color-form vision. Fortunately they are fewer in number, representing about 12 per cent of any class. These students compose that small group of individuals who are continuously experiencing difficulty. They repeatedly demand help from the instructor, very often to the latter's displeasure. Their difficulty is due either to serious color confusions or to protracted latency for form responses. Very often their confusion is so extensive that they are unable to see at all, or only very indistinctly, the histological detail even after it has been pointed out to them. I have verified this by repeated observation in the laboratory.

The majority of these students only profit to a limited extent by the instructor's help. Their confusion is extensive and persistent enough to handicap them seriously. The instructor will have to point out repeatedly the same or similar detail before the student can appreciate it. The work becomes a difficult task for them, and they progress to the extent of about 10 per cent.

Contrary to what might be expected, those unfortunate students who are color-form blind do nearly as well as those who do not have any significant color-form defect. Their rate of progress averages about 46 per cent. They constitute about 8.3 per cent of any class.⁶ The explanation of this phenomenon is not as Macklin assumes when she writes: "For two years the students ranking highest in histology have been totally red-green blind. They learned the morphology of the section, and did not depend merely upon the general staining reactions to help them, as some students do." This is a very natural assumption to make, but a faulty one. From the foregoing discussion of the color-structure

6. I have found that the percentage of color-form blindness varied from year to year. It ranged from 5 to 13 per cent, with an average of 8.3 per cent. This may explain the high percentages of so-called color blindness found by Macklin, who reports 11.0 per cent, and Tocantins and Jones, who report 12.8 per cent.

relationship, one can readily see that the perception of structure in disregard for color would be a very difficult procedure.

An understanding of why the color-form blind are able to do so well necessitates a consideration of two factors, both of which are prerequisites to this understanding. First, we must appreciate certain aspects of the vision of the color blind. And second, we must appreciate the color reactions inherent in any hematoxylin and eosin preparation.

No distinction will be made between the various types of color blindness. It is beyond the scope of this investigation. Only a few of the general principles common to all and which are pertinent to this study will be considered.

The vision of the color blind is scotopic in nature. It is similar to the dark adapted normal eye. The yellow and blue portions of the spectrum have expanded to absorb the rest of the spectrum, while the various tints and shades have become colorless. The color blind are hypersensitive to changes of intensity, as well as to the bluish hue which appears very intense to them. It is this hypersensitivity to blue and to changes of intensity which provides, in part, the answer to why the color-form blind are able to do nearly as well as the good color-form class.

But, before proceeding further with this aspect of the explanation, it is necessary to consider the hematoxylin and eosin preparation. Hematoxylin, in solution, is a bluish dye. It is specific for nuclear structures. It selectively stains the nuclei of the various cells in the tissue causing them to stand out against the cytoplasmic structures. Eosin, in solution, is a yellowish-red dye which is specific for cytoplasmic and fibrillar structures. However, when used together, these two stains, in addition to their specific behavior, react with each other and modify the general color reaction over what it would be if only one of the dyes were used. This produces the great variety of color effects that are present in any hematoxylin and eosin stained preparation.

To the trichromatic eye, which views the slide in a non-critical, generalized way, the dominant color impression received is that of purple. This may vary from a reddish-purple to a bluish-purple, and the degree of saturation may show considerable variation from slide to slide. It is only when a detailed, critical inspection is made that the vast array of colors becomes apparent.

If this same slide is presented to a color blind subject, and he is asked to tell what general color impression he receives, one of three answers will be given, depending somewhat upon the type of color blindness encountered.

The first possible answer is "I see blue." This reply is usually characteristic of the red-blind. To them, the red component of the purple is colorless, and the bluish component very intense. Therefore, they see blue.

The second possible answer is "I see green." This reply is usually characteristic of the green-blind, and it may be prompted by one of two factors. First, the red is seen but interpreted as green, or, second, the subject is over-compensating for his green defect and calls practically every hue green.

The third possible answer is "I don't know what color it is." Such a reply is characteristic of an individual who is either both red and green defective in nearly equal ratio, or who does not care to commit himself on colors for fear of making an embarrassing gross error.

Regardless of what the reply may be or what color the subject believes he sees, the fact remains that the bluish coloration derived from the hematoxylin will appear very intense to all color blind subjects. They will accordingly rely upon their sensitivity to this intense blueness when studying the slide and identifying the tissue. On this basis, they are able to differentiate about as readily and accurately as the good color-form subjects.

The latter students rely on their ability to perceive colors accurately. Since they experience no color confusions or delayed form responses, they have no difficulty in learning to recognize readily the various tissues and accordingly show a good rate of progress.

It is the weak and the defective, especially the latter, who face a serious problem when they use the microscope. The vision of these people, like the good color-form class, is photopic in nature. They have no special sensitivity to either blue or to intensity changes. Therefore, they cannot rely upon these for differentiating tissue structures, as do the color-form blind.

Furthermore, being color defective, they cannot perceive color correctly and consequently encounter many color confusions which interfere with their perceptions. Inasmuch as they cannot depend either upon color or intensity for their guide, they are unable to adequately differentiate tissue structures. Accordingly their work is hard and their progress slow.

CONCLUSION

Application of this Study to the Teaching of Histology.—I believe that I have demonstrated that there is more to the study of histology than learning how to use the microscope and devoting long hours to a study of the slides, as fundamental as these are. If properly understood and utilized the information gained by this study can be of practical value to both the students and the staff members.

We cannot correct the color-form defects of the students, but we can and should compensate for them. In the first place, each student should be carefully tested and informed of the status of his color-form sensitivity. He should be made to realize how it may affect his work. This will give him a better understanding and appreciation for the task he is undertaking and the difficulties he may encounter. His attitude toward his work and toward staff members will be altered and his emotional behavior materially stabilized. This will result in more efficient work. In the second place, the instructors should appreciate the influence that color-form may have on the work of the students. This will lead to a more tolerant and sympathetic and helpful attitude in the laboratory.

A third way to compensate for such perceptual defects is to exercise care in the selection of slides to be used both for laboratory study and for practical examinations. Only high quality, well stained, sharply differentiated slides should

be tolerated. Well stained slides will provide for a maximum of saturation of colors. Sharply differentiated slides will provide a maximum of color contrasts. Thoroughly dehydrated and properly cleared slides will establish the sharpest possible definition among the tissue elements. All of these conditions are essential for maximum visual acuity. They will provide for the student the most advantageous working conditions.

I am inclined to believe that a more neutral stain, such as iron-hematoxylin, should be used for all laboratory slides. This would eliminate, to a very large extent, the color element, thus solving the difficulties present in the hematoxylin and eosin preparation. I do not wish to leave the impression that color and form perception are the all important factors to success in the study of histology. Certainly, this would be an unwarranted conclusion. It is an important factor which has been much overlooked.

Application of this Study to Medical Education.—Tocantins and Jones raised the question as to whether color blindness should be a bar to the study of medicine. They answered this question in the negative. However, they were of the opinion that the color blind should not be permitted to perform certain laboratory tests involving colors; that they should be barred from pursuing such specialties as dermatology, and that their interests should be directed into such fields of medicine as radiology where color has no counterpart.

Macklin holds a similar point of view, but in addition has offered a most worthwhile suggestion. She believes that defective color vision should not be a bar against the study of medicine. However, if an otherwise mediocre student should be found to be color defective, he should be strongly advised against the study of medicine.

A further question presents itself: Should the color blind or defective be permitted to engage in the general practice of medicine? The general practitioner, more than any other physician, is left largely to his own resources. He must rely on his own powers of observation for diagnostic purposes. No one knows what percentage of wrong diagnoses—on the patient, in the test tube and under the microscope—are the result of the diagnostician's defective color-form sense.

This study indicates that the color-form blind are not handicapped with the use of the microscope in studying hematoxylin and eosin histological preparations. However, I cannot state with assurance what the effect would be with using other techniques, with the exception of Wright's stain on blood smears in which defective color-form sense is a serious handicap, proportional to the extent of the defect. However, the color-form defective are seriously handicapped with the use of the microscope on hematoxylin and eosin preparations.

Tocantins and Jones and Macklin have shown that the color blind are seriously handicapped in laboratory and clinical diagnostic studies. I have many times made similar observations. The many errors made by students in laboratory determinations is without doubt due in part to weak and defective color sense, but such errors are not of a too serious nature.

At present, our knowledge of color vision, as it relates to the study and practice of medicine, is too meager to permit a final answer to the question as to whether the color blind and defective should be excluded from medical colleges. However, I am firmly of the opinion that this factor should be considered before admitting students. Every applicant should be given color vision tests. This procedure should be made a routine practice. Such tests should be given by persons who are trained and skilled in the knowledge and use of color blind tests. A reliable differential color diagnosis requires skill.

Such color sensitivity records should be kept on file in the office of the dean and assistant dean for use in advisory and student personnel work, in addition to being used for admission purposes. Additional copies should be available for use by faculty members. Such a procedure should encourage further study in this seemingly important but much neglected field.

It is encouraging to see that the selection of medical students is becoming more objective and scientific. In addition to the administration of intelligence tests and aptitude tests, and to the analysis of scholastic achievements, color vision scales should be used. Furthermore, there is an urgent need for a thorough study of the personality of students admitted to medical colleges. Such factors as personality types, emotional stability, mental soundness, and the like, should be measured objectively and used in student entrance determinations and in advancements.

Such a program as outlined above, if carried out adequately, will foster a higher type of medical student, will increase the efficiency of our medical training, and will elevate the standards of the medical profession.

SUMMARY

1. Color vision tests were given to 432 medical students during the years 1933 to 1939 at the University of Kansas and the University of Arkansas. The students were rated qualitatively as regards degrees of color and color-form sensitivity, and grouped into four classes for convenience of comparative study.
2. The numerical grades earned by these students on a series of practical laboratory examinations were arranged in the exact order in which the examinations were given. These grades were treated so as to obtain the numerical progress each student made during the series of examinations, and this figure was converted into percentage progress. The average percentage progress for each color-form class was then determined.
3. The complete series of individual examinations was then averaged in order to find the final average numerical grade for each student, and for each color-form class.
4. Both the final average grade and the percentage progress for any given color-form class was compared with those of every other class, and the difference recorded. These differences were treated statistically in order to determine

how significant they were. The difference in the percentage progress between the four color-form groups was found to be very significant, while that for the average final grade was found to be probably nonsignificant.

5. The conclusion is reached that color-form perception is a very important factor in the progress of students in microscopic anatomy, but bears little positive relationship to the actual grades made in the work.
6. It is suggested that a better understanding and appreciation of the influence of color and form vision on the use of the microscope will lead to a more agreeable relationship between the faculty and the medical student, and to a greater appreciation and understanding on the part of the student for microscopic work.
7. It is further suggested that the color testing of all applicants for entrance into medical schools should be made a routine practice, and that such records should be used for student personnel advisory work.
8. At present our knowledge of the relationship between color vision and medical practice is not adequate to give a final answer to the question: Should the color defective be admitted to our medical schools?

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The Bane of "Pre-" Courses and Vocational Education as Preparation to the Study of Medicine

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"Pre-," "pre-," "pre-," "Pre-" this and "pre-" that! The quest for more "pre" must be disturbingly confusing to the educator. Surely, he must be asking himself, over and over again, "What is all this 'pre-' business about? What has become of education? The good, old fashioned kind of education which turned out people with culture; people who had an education and could use it to good advantage in any field of activity—without any 'pre-'." It is characteristic of human beings to desire and to seek change rather than to stay with what has been tried and not found wanting. The craze for speed fads and bizarre ideas is today a large part of every plan of education. Most curricula are built up with a central idea of "speed." Vocational education! Still more "pre-." What will be the end of it all?

The moving belt of industry has been adopted by education. The result is the same in both instances. The nut will fit only one kind of bolt. It cannot be used for any other purpose than to fit that certain bolt. It is a purely industrial robot. Those who come through the "pre-" courses and vocational courses, the product of the educational moving belt, are often educational robots—fit for just one thing and a poor fit at that. To my mind, an education implies the ability to put to good use knowledge acquired in college or from study outside of college. It is not necessary to attend college to get an education, but it is helpful because it is easier to learn under guidance, direction and supervision, than by reading or study in private. Even the radio now offers courses in many subjects and some of them are not bad.

It seems to the interested observer that education has not advanced, except for added knowledge or information; rather it has steadily been sliding backward. There seems to be an irresistible impulse to "speed up," and to "standardize" or to "patternize" everything to a preconceived model of what education should be for fear that some one will cry "old fashioned." There is not today any indication of the existence of a desire to "hold fast to that which is good." There is every indication of a desire to "get into line." Everything is secondary to keeping in step with new models in education. And, yet, education, in this country at least, has not progressed at all. It is 100 years behind the times so far as real education is concerned. College authorities seem to be very much concerned about being able to answer "yes" to the query whether they give "pre-" courses, rather than to be concerned about the real value of what they have to offer. Then, too, they try to do too much in too short a period of time. If a certain professional group says that those who wish to enter that group must have had "not less than" two years of college work, the college, instead of protesting against anything that is suggestive that less than four years of college is

sufficient, promptly tries to conform to the "two year" idea or demand. Courses are revamped; curricula are overthrown; "pre-" courses come into being. They fear that if they do not do this, they will be criticized for being old fashioned, not in step, with the result that they will lose students; finances will be affected; teachers will seek other berths; everything will go "haywire."

Are any courses fundamental to a good education? What is a good education? Does it imply storing in the student's brain as many facts as can be crammed into it, causing a sort of factual constipation of mind? Or does it mean development of the brain to the end that the owner will be able to think logically, to reason, to pass critical judgment—all on the basis of knowledge which is usable? The possessor of a remarkable memory rarely is what one would term an educated person. Usually he is a mental juggler. He can produce facts from his memory as the juggler can produce rabbits out of a hat. But to what good? The juggler is an entertainer; the memory man usually soon becomes a bore. He overwhelms his listeners with the power of his memory. Eventually he does not even entertain or amuse. The educated person, on the other hand, can entertain, conversationally and otherwise. He is ready for any emergency. He does not know all there is to know, but he knows how to proceed to learn more of what he does not know because he has laid a firm, solid educational foundation, provided that the college authorities have not hindered his advancement by insisting on his taking certain "major" courses with certain prescribed "minor" appendages. Even the high schools now have programs which prohibit getting a good foundation in education. They "major" and "minor" and "vocationize" no end. I recently heard an engineer, an educator in that subject, assert with much positiveness that vocational education should be in high school! Soon, it will insinuate itself into the grammar or grade school, or even into the kindergarten. Infants, as soon as they can understand spoken language, will be asked what field they intend to enter, and having made answer, their "pre-" and vocational education will start. Oh ye shades of good old fashioned education!

True, "life is short and art is long;" there is much to learn and little time in which to learn it. But there is no law which compels any one to learn it all in a given time. And, no one should be obsessed by the idea that when he has come safely through these "pre-" courses, even professional courses, that there is nothing more for him to learn. The bestowal of a beautifully inscribed piece of paper or even parchment as evidence that the holder has had bestowed on him a degree does not imply that he really knows anything nor that he need no longer try to know anything or more than he may know at that time. He is not a finished product. He has only taken the first step. There are many more steps to climb; much more to learn. A truly educated man never ceases learning, a little every day, because "art is long." There exists too much conviction (or is it an idle wish or hope?) that four years in college, representing usually 120 hours of attendance on classes and passing the prescribed examinations (which is not difficult because one can cram) is the basis of determination whether the student is worthy or not, is the end of everything so far as education is concerned. No further effort need be made to improve the mind!

One must admit, of course, that there is a difference in brains and that far too many poor brains are being pushed through college to no good, but even these brains have the right to try to do something which time may show they can do. If they can hold out for four years, well and good. They will be stamped with a degree. Note how many of these brains struggle on and on; how they are laden with subject conditions and failures; sometimes placed on probation, not only once but two, even three, times, only to emerge in the end with the coveted label—a bachelor of this or of that. Can that be termed an education? Perhaps, with more time, less crowding, a little more consideration of the wishes of the student as to what subjects he would like to study, rather than to force him to conform to a pattern (we hear much about patterns nowadays), he might be able to acquire an education sufficient for his needs and purposes. Who knows? There is little opportunity to get an answer to this question. The educational "pattern" does not permit further inquiry.

It is a noteworthy fact that more and more one hears less and less of "education." The term now in use is "training." He has been "trained" in this or that. His "training" has been good. While to me the word "training" suggests the trained bear, or even athlete, it is really a quite descriptive term for the present scheme of education. Students are trained; they are not educated. They are not given a chance to be educated. They must conform to a pattern. Some one is always presenting new patterns. Eventually, those who come through our colleges may be labeled "Pattern No. 1, 2, 3, etc.," instead of bachelor of science, of arts, of education, of philosophy, etc.

In my opinion, every student should first secure a real, a good fundamental education, one which he can use advantageously in any field of activity. Whatever trade or profession he may enter it will educate him in the essentials of that field. Later, he will learn more about it and he may himself contribute something to his field as a result of his experience and observation. He will continue to learn so long as he makes an effort to learn. There must be—and there are—subjects which can be regarded as being fundamental in education; courses which in themselves are an education if pursued with the proper spirit and with understanding. This implies, of course, that courses of study are built up as they should be, sequentially, leading on and on, not offered in chunks, indigestible, forced in, starting somewhere and ending somewhere—sometime. No attempt should be made to do it all at once. Let the student's ability determine how fast he will travel educationally. Let him go along with his own pattern rather than forcing him to conform to a pattern which is a pattern for the "average" student—and rarely is that. Give him opportunity to follow his own inclination, to develop his own interests.

Why a four year course? Why not base the length of the course on the student's ability, his mental powers? What difference does it make if he requires five, six or even more years to make a creditable finish? Why not arrange courses in subjects amenable to such a plan on the basis of work to be done rather than on the basis of time—of hours or of years? It can be done although it will require a change in administration. The little old red school house, with one teacher and

eight grades, did a highly commendable job in education. All the pupils did not do equally well, but the quality or mental ability of students always will vary. A slow student may be a good student. A good student may be only a brilliant student. He may, in the end, fall far behind the slow student in real accomplishment. Many, if not all, educators will say that the scheme will end in a rout; that it is contrary to all accepted practice. I do not believe that to be true. Even now some colleges give opportunity to finish four academic years in three calendar years. Has that plan created disorder? Not at all. Then, why not extend it further?

What is fundamental in education? The answers to this question will vary widely. One could name a few subjects or many, depending on how one views education. There is always the tendency to say too much by way of explanation of why one has said anything or for fear that the depth or extent of one's own education may be questioned. It is essential to boil down and down until only basic subjects remain and then to add, slowly, carefully, what may be regarded as supplementary subjects. It is presumed that the soil is there; that it is rich and fertile; that it is susceptible of cultivation; that it can produce something worth while if cared for properly and kept free of weeds.

Culture is the end to be aimed at in every case. Three subjects stand out in my mind as being outstanding in that respect: mathematics, philosophy and Greek. Mathematics is splendid mental gymnastics. It tones up the brain cells and gets them ready for action. Philosophy gives good judgment, the ability to reason, to think logically. Greek, and I do not mean the language but the culture, gives a wide range of information. President Carleton Stanley, of Dalhousie University, Halifax, Nova Scotia, has written a little book, entitled "Roots of the Tree" which sets forth admirably what Greek means in the scheme of education as I see it. It is the "root" of much of education; in fact, virtually all of it. It is the beginning of all subjects offered in the college curriculum. Even the language is the "root" of a large part of the languages spoken today by people of culture. Latin can well be included here. I might say, Greek and Latin instead of only Greek. Biology, physiology, physics and chemistry I would name next—not going too far nor too deeply into any of these subjects, but a sound fundamental course, leaving further and more detailed study as a later project. This can be topped off with a good course in psychology. Since we are an English speaking people, English, more and more English, must be stressed: grammar, logic, composition, rhetoric, literature. Most people are notably weak in the use of the English language, spoken and written. Any one who has had a long and large editorial experience will agree with this statement. Even those who are credited with having acquired an education often do not know much about their native language—whether it be English or any other language. Slang is playing havoc with good English even as jazz and swing are demoralizing good music. Bad habits are acquired easily and persist; good habits fall by the wayside easily and rapidly and are regained with difficulty. That is true not only of speech but also of music or anything else.

I may be asked, "What about history?" I am very fond of history. I believe that every one should know some history, at least the history of his own country. But the grade school and the high school should and do cover the necessary history fairly well, if it is taught as it should be taught. As I am speaking particularly of college, I have not mentioned other subjects which have value. And, if one has a definite idea of what his future vocation will or may be, other subjects of value for that purpose could be mentioned. For instance, any one who intends to study medicine will do well to become interested in genetics, embryology (although this is offered by nearly all medical colleges), comparative anatomy. One bad feature of all colleges and teachers is that they try to do too much in the time available. They try to cover too much ground. Therefore, there is too much rushing; the bread is spread too thin with butter. Why not give a little and give it well, leaving something for the future? Why not impress on students that college is only the beginning: that college will only prepare them to go on alone after they leave college? That acquiring an education is a life-time job; in fact, it never is completed? To stress these facts would be an incentive for the student to do better work than he does now believing that everything must be completed before he leaves college after four years in residence.

Is college residence an absolute necessity? It is not. I have often been told by eminent teachers and authorities in their respective fields that students in correspondence courses do better work than is done by students in residence. Perhaps, that is so because the correspondence course student is imbued with the necessity of working hard in order to merit credit. And, he cannot afford to attend the college. He is poor. Hence, he makes the most of every opportunity offered him to acquire an education.

Much is said about the advantage of small classes over large classes because of closer contact with the teacher. To a certain extent that is true—if the teacher is a good teacher. In the main, however, a good student, a real student, will fend for himself no matter how large the class of which he is a member. He does not want to be spoon-fed. He wants to feed himself, which is the proper attitude for every student to take. Unfortunately, many students are obsessed with the idea that time—four years, 30 hours per year—is the hurdle which they must surmount. Therefore, the job market is flooded with college graduates who have failed utterly to acquire an education—even the rudiments. Education, as every educator knows, is wholly a matter of personal effort. If the student works hard enough and in the right way, digesting mental pabulum, instead of storing it away in pigeon holes in his brain, he will have an education and he will know what to do with it.

How many persons own a dictionary? How many of those who do own one ever use it? A good knowledge of the dictionary is an education in itself. It is a good book to consult at any and all times. It is almost the sum total of all knowledge. It certainly is a very necessary adjunct to a good knowledge of the English language and how to make good use of it. Even the cross word puzzle is an aid to education. It not only gives the information that "Ra" is the Egyptian sun god, but the real student will be inspired to know more about

Egypt, its history, its people, what role that country played in the history of the world. In other words, the real student always wants to know and takes the trouble to learn by consulting available reference books of which the dictionary is one and a very good one.

Teaching is a hard job. Students must be taken as they come. The teacher does not have a voice in their selection. Each year calls for a repetition of the course, which is deadly and throttles ambition. The time offered for the coverage of a course is strictly limited. If the teacher does not meet this requirement, he lays himself open to criticism. He is forced to look after good students, indifferent students, poor students. If he fails too large a number, it is not a case of many poor students but of a poor teacher, regardless of his ability. If all teaching could be done on the basis of "Mark Hopkins, the student and the log," it could be done well, but time forbids; the mass of knowledge in every subject forbids; the large numbers of students forbids. Yet, there is need for such teaching and opportunity for it should be made available. With one department head and two, three or more assistants, it is not possible for every student to contact the best teacher in the department. And inasmuch as many students cannot help themselves to acquire an education, they must have nurse maids and cooks who will prepare the food and also feed it, perhaps digest it for this class of students. More careful selection of students, fewer students, revamping present courses and methods of presentation; a return to real education, no vocational or "pre-" courses, will go far to rid education of the incubuses by which it is beset today.

Constructive Criticisms of Undergraduate Teaching in Psychiatry

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The teaching of psychiatry to the undergraduate medical student has made progress during the past fifteen years, but that there is still much to be done is evidenced by reports of conferences on the subject of psychiatry in medical education. These conferences have been an outgrowth of interest on the part of the National Committee for Mental Hygiene and a Special Committee of the American Psychiatric Association, which directs its attention to this subject.

One is impressed by the earnestness and open-mindedness of the various teachers who seek to improve their methods from year to year in the face of limited time, funds and teaching personnel. It is unnecessary to stress the fact that they realize the importance of reaching the medical student in order to supply him with information of value in his later practice. No one will question that such a goal, when accomplished, will supply the outposts so necessary to a full development of mental hygiene functioning. Inimical situations, as well as personality difficulties, must be recognized early if prevention is to be successful, and it is the physician first contacting the case who is in a position to do so. Again, we will all agree that so far, for various reasons, medical teaching has not so equipped him. This presentation attempts to point to deficiencies in the graduate which seem evident from observing him in practice. These observations cover a period of ten years, and are offered for what they are worth by one who does not himself teach psychiatry in a medical school.

It is sometimes possible to get a better perspective of a situation if one is not too close to the problem. Institutional psychiatry gives one that perspective as it relates to the medical student and his teachers. Remembering my own undergraduate days, I have paid especial attention to the undergraduate and recent graduate, contact with whom has afforded ample opportunity to study their deficiencies. The type of questions he asks me and what I feel impelled to ask him, bring out points that have not been stressed, that he has forgotten or that were not taught. These students and recent graduates have all come from approved medical schools, most of which have courses in psychiatry considered adequate at present. Two of the hospitals with which I have been connected supplied teaching material for the students; in one hospital, teaching was done by a member of the faculty; in the other, by a hospital staff member. Three of the hospitals accept students for summer assignment as junior interns. With reference to the summer student and the recent graduate (after internship) it might be said that with an interest in psychiatry, they should have derived more from these courses than the average student.

Two other sources of less intimate contact have also reflected deficiencies: the commitment papers made out by physicians and the failure of general hos-

pitals to handle simple psychiatric complications. Without a closer study, however, these cannot be evaluated properly and are only mentioned. These criticisms of the teaching of psychiatry are directed, in general, toward the application of psychiatry to the practice of medicine without reference to future specialization.

EVIDENT FAULTS

A few years ago I spent several weeks in a medical fraternity house at one of our better medical schools and had the opportunity of studying the student's attitude toward his courses in psychiatry. I had no connection with the school, so was able to get the students' unguarded feelings toward these courses. Since then I have made it a special point to interrogate those undergraduates who have spent their summer vacation in hospitals with which I have been connected. On the whole, the general reaction has been the same as I found on my initial inquiry.

There seems to be two types of reaction: one in the student who is interested in psychiatry but who is puzzled and somewhat let down by his failure to understand what he feels should be part of his education; the other is the student, usually surgically inclined, who is amused by this course and treats it with levity, if not open disrespect. Basically, these two reactions are the same, as they are responses to a failure of comprehension and consequently an inability to see the practical application of those principles being taught. In the first instance, the student wants to know; in the second, he doesn't care because he thinks he will not have use for it anyway.

It is this failure in appeal to practicality that leaves him with a feeling of futility and it seems fundamental to his lack of interest. In other words, the subject matter fails to reach him. For one thing, he does not see any correlation between his course in psychiatry and the other medical studies. There is no common ground offered where he can get his bearings for the purpose of evaluation. The material for teaching purposes in the psychiatric outpatient department has, for the most part, been picked over by clinics of the other specialties and reaches the psychiatrist as a last resort. It is likely, then, that what he sees there is purely psychiatric and he has only to think in psychiatric terms. The matter of judgment and of utilizing his other knowledge has been taken from him and consequently he develops a mental compartment for dealing with things psychiatric. His future, so far as practical application of psychiatry is concerned, is damned by this segregated type of training. He is not trained to think medically in the psychiatric clinic, and in medicine he gets the impression that if one can find nothing from a physical or laboratory angle to account for the symptoms, the patient then becomes a subject for the psychiatrist.

I am certain that this separation of the medical and the psychiatric is not intended; but actually that is what happens. The student is left with two compartments of thinking, one of which is medical and surgical, the other is reserved for psychiatry. The second fault is further amplified into serious handicaps with a total failure to see psychiatry in its proper relation to medicine.

A result is that the student is unable to consider the individual as a whole. Although an attempt is made to impress this necessary principle, it is not carried out in practice. One cannot think of epigastric distress in one sense in the psychiatric clinic, in another in the medical clinic, and yet another in the surgical clinic. Compartmental thinking, however, does not permit any other type of approach. A human being must be viewed as a person and not as an object differing in aspect depending on the point of view. The concept of the individual, as a whole, must be borne out in practice, otherwise the student has only verbal appreciation and little understanding. He is not, in his clinical instruction, given the opportunity to see the principles and concepts of psychiatry applied to specific medical problems of the individual.

These concepts are difficult to appreciate even when so applied, and for the average student impossible in a purely didactic sense. He gets a partial insight as he sees them applied in the psychiatric clinic, but when he attempts to reapply them elsewhere, he fails. The method of placing these tools in his hands has made it impossible to apply them in any but a specified situation. He sees them apart from his ordinary medical experience, poorly related and in most instances useless. He associates them, in large part, with "insanity," with frank mental disease and the other conditions which are properly committable and not subject for treatment by him.

This confusion is intensified by trying to make these concepts agree with the preconceived ideas concerning "insanity" with which he entered the medical school. He does not see psychiatry in its broader sense as a subject which deals with people. He has not learned the importance of understanding personalities, the factors functioning in their formation and how they become disordered by any pathology, whether it be discoverable in test tube, microscope or social milieu. These things he cannot learn unless they are demonstrated in situations which will be familiar to him in his practice. They are not understandable and consequently useless without the demonstration.

Out of this grows the inability to recognize when "mental" factors are of importance in a given illness. The suspicion of their presence must precede any attempt to elicit and evaluate them. Aside from the inability to suspect, the student fails in his attempt to uncover them. We see students who come to mental hospitals during the summer months, who are unable to find enough material in an obviously psychotic patient to substantiate a diagnosis or make understandable the patient's presence in the hospital. Certainly, in practice they will not discover the reason for minor shades of maladjustment. They do not learn when to suspect disorders of personality, nor do they seem to learn that a personality which is well is not the same as that personality when it is sick, whether (if we must revert to dualism) it is mental or physical.

The origin in either field is always reflected in the other. He should know that, aside from children and old people, a patient brought to his office by someone else, and not coming of his own accord, at once arouses the suspicion of mental disorder. He should also know that what appears to be a "pure" psychiatric disorder may be the expression of some obscure underlying physical disease, that

the converse can be true, and that we can have admixtures of both. These can be impressed on him only by illustrative clinical material. Because of the one-sided clinical teaching, however, he graduates with a false sense of the importance of psychiatric diagnosis—diagnosis in a statistical disease-entity sense—as opposed to an evaluation of the patient's problem. It is understandable, too, because of the insistence on diagnosis in his other studies, but he fails to realize that in the latter, diagnosis implies etiology, pathology and treatment, whereas the psychiatric diagnosis seldom implies any of these.

CORRECTIVE SUGGESTIONS

General.—In the criticisms given above, methods of correcting obvious faults are implied. There are, however, some suggestions which can be made with, at least, a partial realization of the difficulties involved in carrying them out. Some of them have been objectives for a long time, but the elements of time in the curriculum, funds and personnel, have made them unattainable. The carrying out of them will have to be deferred until conditions are favorable.

It would seem that at least the preliminary groundwork in the study of personality and personality functions could be given in the premedical years. This is subject matter not only of interest to the prospective medical student but should be of value to students of the other professions in which an understanding of people would be helpful. Its mental hygiene implications should appeal particularly to future lawyers, judges, teachers, ministers and others who deal with the individual and his problems. A clearer understanding of these principles, spread over a larger group, is bound to influence the cause of prevention. The medical curriculum could thus be relieved of a large part of this groundwork and the few hours of the first year given over to orienting the preliminary study to the medical course.

Such a course in the academic years should be given by a psychiatrist, one who is familiar with its clinical implications and who will give to it a psychobiological¹ rather than a purely psychological slant. He, too, will be cautious about generalizations and careful not to precipitate acute introspection in younger students who are having their own personality problems. Undoubtedly, much questioning will arise and his time should be offered and available for a private discussion with the student of any problem which it has brought to light. It opens the way to mental hygiene endeavors for a large part of the student body. One sees difficult personality problems arising too frequently from such courses when the lecturer is not fully aware of possibilities incidental to the stirring of a student's emotions. These cautions are, therefore, necessary if one is to change this course to the premedical years and make it available to a large group.

Aside from this suggestion, no effort will be made to outline a definite curriculum. These vary with the ideas of the individual head of the department and depend on the facilities available. Many have their good and bad points and suggestions given below can be applied to any of them.

1. Meyer, Adolph: Scope and Teaching of Psychobiology, *J. Assoc. Amer. Med. Colls.* 10:98 (Mar.), 1935.

A definite effort should be made at the start to correct the student's lay ideas of mental disorder. By the use of set questions put to a number of students over a period of time, one can bring out these preconceived ideas and throughout the course point out what psychiatry is not as well as what it is. Any attempt to teach psychiatry without so doing leads to confusion in the student's mind because he cannot make his own ideas fit in with what he is taught. He is quite likely to finish the course with his original ideas intact and forget the subject of the lectures.

Simplification of the language of psychiatry should further aid in an avoidance of confusion. We are still holding over from the era when it was felt that psychology offered a solution to the problem of mental disease. It has contributed a great deal to a better understanding, and to the fields of treatment and of prevention, but it has left a vocabulary out of proportion to its contributions, at least so far as the medical student is concerned. There should be a simpler way of making these available without burdening him with the by-products of their evolution.

This complicated practice is possibly a continuation of the defensive phase of development in psychiatry when it was in process of emerging from its institutional isolation. This would seem to be no longer necessary. We cannot afford to overwhelm the student with the idea that psychiatry is omniscient. Its knowledge is broad, its understanding limited, and the student should be given a clear idea of where it stands today. Investigative curiosity of the student cannot be stimulated by leaving the impression that we have the field well in hand and its problems mostly solved. He soon learns the contrary. He should be taught the limited significance of psychiatric diagnosis, and that the real objective is an understanding of the patient and his difficulties.

These points sound trite, but students are graduating today without a knowledge of these distinctions and differences. In part, it is probably a reflection of our attitude toward our specialty. A healthy sense of humor might go far in relieving the difficulty. Austerity is no longer a fashion of the times.

Specific.—With the groundwork laid for an understanding of personality formation and function, one is in a position, during the clinical years, to deal more particularly with reaction types and varying degrees of sickness in the individual. The student should become familiar with various types of personalities, their characteristics and patterns of reactions to given situations, including the physical (toxic—organic), environmental (social—economic) and inner mental conflicts. This understanding of personality he can apply anywhere in the practice of medicine. It should teach him to look beyond a presenting physical complaint and to evaluate the suspected etiologic agents when offered a complaint which might be considered "mental or nervous." He should be led away from a consideration of conditions as being a neurosis or dementia praecox or any other nosological entities.

In this connection the use of what might be termed advanced "malignancies" of psychiatry (frank dementia praecox; severe psychasthenia, etc.) should be

limited to two purposes: (1) as a means of demonstrating end results and attempting to show where the disease might have been detected at an earlier stage when treatment might have been of avail and (2) to illustrate personality in the raw without the usual disguise built up by mental mechanisms. This should be correlated with a study of the personality development of the particular individual under consideration. From clinical observation, it would seem that the personality disintegrates along the lines on which it has been laid down. These demonstrations should illustrate this point and further amplify the student's knowledge of what is to be expected of certain types of personality. This will be of aid to him in his dealings with people. A knowledge of dementia praecox, as such, can only make it possible for him to advise the family as to eventualities and the limited possibilities of treatment. A more extended use of this material expands his fund of knowledge but contributes little more to his understanding.

Not all teaching should be restricted to the frank psychoneuroses and psychoses, but should, for the most part, consist of unselected material. Let the student make a thorough study of his patients as individuals with a problem, rather than as dermatologic cases or cardiac cases or what have you. Clinic assignments for broadening his training are all right, but he should have an opportunity to decide what the major factors are in a given case. Then, instead of discussing the case with any one specialist, let the discussion be held before several specialists representing the factors involved. This is the method which has been practised for years in postmortem teaching and could well be applied to the living. The study of material by separate clinics leads to the objectionable compartment type of thinking. The conference method has another feature in its favor in that it enhances the psychiatrist's knowledge of general medicine and spreads the teachings of psychiatry to the other specialties. In this way, the student can see each specialty in its proper perspective. It gives substance to the aim of seeing the individual as a whole.

This procedure should be carried into the ward teaching, where the student continues to consider the individual as a whole. The case history outline should contain a personality study and psychiatric factors to be worked out in connection with every case, regardless of what the illness is. This need not be any more detailed in relation to the whole history than that allocated at present to the neurological examination in relation to the general physical status. Positive findings, of course, call for more detailed study. Here, again, the multiple consultant method should be carried out. In time, there will be an infiltration of psychiatric principles into all branches of medicine, and a better knowledge of general medicine into psychiatry. When this desirable end has been reached, multiple consultants will only be needed in highly complicated cases. Psychiatrists cannot be expected to cover the whole field indefinitely.

At present psychiatric consultation work is being carried out on medical and surgical wards, and in one school, to my knowledge, the psychiatrist goes on the other wards looking for teaching material. If one leaves the matter of asking for a psychiatric consultation to the intern or resident on the ward, one is likely

to get only the more obvious personality disorders. Visits of the psychiatrist to the ward is a better arrangement, for he can see problems which to the untrained would not be visible. A better scheme, during this transitional period, would be for the psychiatrist to take over a medical ward (under supervision, if his knowledge of general medicine is limited), and actually treat the individual as a whole during a physical illness, giving due attention to the personality factors involved. In this way, we could expect that the infant field of psychosomatic medicine might be broadened rapidly and out of this grow a truly medical psychiatry. It might even eventuate in a truly comprehensible, practical textbook of psychiatry for medical students. So far as I know, there are at present few books which approximate this standard. A disparagement of our present textbooks of psychiatry is not intended, except that they are more suitable for students of psychiatry than for students of medicine in general. Psychic-physical dualism, like the disgrace of mental disease, persists in spite of our protestations.

For a long time, there has been considerable disagreement as to how much and what should be taught the medical student about psychiatry. If one analyzes these opinions, they seem to resolve themselves into differences of method and of subject matter. The more important of the two is the latter, and here, again, the differences do not concern serious but superficial things. There is approximate agreement on the fundamental and generally accepted principles, but this has become obscured by the fog of mooted didacticism. In order, therefore, that psychiatry might be simplified for the medical student and that it might expand its influence by ingratiating itself with and infiltrating the rest of the medical profession, there must be some acknowledged agreement concerning its fundamental principles. These should, then, be outlined clearly apart from the beclouding influence of advanced technicalities not at present of practical importance.

In conclusion, I can tritely summarize by saying that "The proper study of mankind is man," and there is no reason why we should deviate from this dictum so far as the medical student is concerned.

Faith and the Doctor*

BARKLIE HENRY

President, Board of Governors, New York Hospital
New York City

From this day on, men and women will begin to place in each of you the highest responsibility which one human can place in another; the cure of illness and the care of life. In placing such a load on the shoulders of another, a man wants to feel an extraordinary degree of faith in the person on whom he places it. Very often, the enduring quality of his faith will restore him to health sooner; sometimes, his faith in the doctor will make all the slender difference between life and death.

Therefore, I am going to talk to you today as a layman, who has been at times a patient, concerning the faith of the patient in his doctor. Faith is one of the few subjects about which a layman can speak before doctors with something like authority, for no matter how misguided his conclusions may be, the emotions which gave rise to them were caused by his experiences with medicine and medical men.

Faith, in the world today, is becoming a rare commodity. That a man should have faith in his neighbors is the chief pillar of a peaceful society, but today there is no peace, and faith seems to have become at once the jest of cynics and the curse of its possessors. Perhaps, human thought has directed itself too much toward the mass, the cosmos, and turned too far from the conception of the individual conscience, and the supreme importance of the individual spirit. If that is true, and if we are to pass through a cultural age in which the individual mind is to become a unit cell of the mass mind, so that faith between two individuals loses its heroic quality—even so there will still remain all sorts of isolated survivals of individual faith to become the seeds from which the power of faith among men can be reborn. The faith of a patient in his doctor is of such a sort. It would, therefore, seem to be a peculiarly important time for men in the medical profession to realize that in pursuing the lofty ideals of their profession, without cynicism, without corruption, without rancor against the hardships which may befall them, they will be playing more than a small part in creating a new world of faith and peace.

It is no wonder that the decade just closed should have been no less disturbing for the medical profession than it has been for the country and for the whole world. Disturbing? Yes, but exciting, and challenging! Would any of us have chosen to live in any other generation? And will any other generation have had the same opportunity to untangle this muddled world, whether in medicine, in government, or in thought itself, than the generation represented by the present graduating classes? I cannot bring myself to the mood of utter pessimism in which so many people find themselves as a result of the proximity of so

*Address delivered at the Commencement Exercises of Cornell University Medical College, June 1940.

much suffering and destruction, nor can I find no hope in the prospect of a changing world. When Sir William Osler spoke many years ago of Equanimity, and urged it on doctors as a paramount virtue of their profession, he had no need, then, to urge it on laymen too; for he spoke in a world which was at peace. Today, equanimity is a necessity for all of us, and for doctors more than ever, for if they do not possess it, not only will their patients have no faith in them, but they themselves will have no fortitude to face their times.

The layman's faith in medicine meets its first test when he asks: "Where can I find a good doctor?" The question is not easy to answer. If he lives remote from the cities, he will find a doctor somewhere, and may be obliged to take what he finds. He may find one who prescribes the same dark, oleaginous concoction for man, horse, dog and cow; he has, I hope and believe, an ever increasing chance of meeting a doctor whom he and his wife, and his children, will come to love and trust, and to call on in the hours of their adversity, through all the days of their life.

If he lives in New York, he may, through the enthusiasm of misguided acquaintances, fall into the hands of one of those faddists who prescribe (let us avoid the risk of slander) exposure to the emanations from a broadcast receiver for everything; or, if he makes his inquiries with reasonable care, he will most likely secure a doctor of excellent qualifications. If he does not find a good doctor the first time—and he survives to try again—his faith in medicine becomes shaken, and the doctor who gets him next will find him that much harder to cure.

He is especially susceptible to disillusion, if, like me, he is a naturally gullible person. For urban people nowadays are likely to have an innate confidence in medical science and in medicine as a whole. But I fear that faith in individual doctors may not be as great as it was fifty years ago, when the leading doctor was as much a personal factor in all communities as the leading minister, the banker, the lawyer and others. The change, alas, is not the fault of the doctors so much as the fault of uncontrollable influences which have made of modern civilization a thing that is huge, inextricably tangled and incredibly complicated. So the problem for the doctor is how he can exalt the patient's faith in medical science as a whole to a personal confidence in him.

I suppose that the chief reason why laymen admire the medical profession as a profession is because, by and large, medicine, as a whole, has done its job so superbly; partly, it is because most laymen realize that doctors give up such a large part of their lives to a humanitarian service which pays them nothing.

Faith can be broken by financial misunderstanding between a doctor and his patient. I have often wondered if the medical societies could not find some way to educate the public better concerning medical fees, and whether doctors themselves could not find ways to standardize the financial aspects of the doctor-patient relationship more than has hitherto been possible. Due to a lack of understanding of the facts, one often hears some disgruntled patient saying the sort of things Leonardo said about doctors four centuries ago: "Every man desires to acquire wealth to give it to the doctors, the destroyers of life; therefore they ought to

be rich." And today, as in ancient Florence, medicine is judged too often by a few outstanding bad examples—condemned without any opportunity for its own defense, by the word of mouth vote of an unknown and often garrulous jury.

Some of the layman's faith in doctors has been the result of wide popular publicity about medical science. As a result of it, people know more about medicine, and about their own health, than they have ever known before. The difficulty is that the reporters searching out this material must have a dramatic story. The public is not satisfied with scientific results which merely astound the specialists; they must have miracles or nothing. It is becoming clearer, I believe, that the only way to control it, so that it will not harm the profession, is to place its supervision more and more in the control of the medical societies.

It does not increase the public faith in medicine if people read in the papers that a new cure for cancer has been discovered and turn up at all the clinics the next morning to demand it.

Granting that the layman suffering from something more serious than prickly heat manages to place himself in the hands of a good physician, is his faith in him thenceforth assured? As all doctors know, to their sorrow, it is not. Perhaps, I may be forgiven for speculating on some of the causes why patients do not retain their faith in good doctors. There used to be a phrase which recurred constantly in the records of the family welfare agencies: "Non-cooperative; case closed." How many doctors, I wonder, excuse their loss of certain patients on the ground of the patient's failure to cooperate, when the real reason is some false impression which the doctor has unwittingly given; for example, apparent neglect, lack of interest in the case, or palpable inability to comprehend the patient's normal manner of life.

I believe, also, that some doctors lose patients, not through the patient's inability to cooperate, but because the doctor cooperates too much. A normally intelligent person comes to a doctor expecting to be told what is the matter with him and what he must do to get over it. He is likely to come in the mood of a penitent, or with the desperation of a Ponce de Leon. He puts himself in the state of mind of his childhood, and looks to the doctor as a wise, all-seeing parent, who will take him under a protecting wing—but who will also be stern with him when necessary. At an early stage, I imagine that most patients will try to tell the doctor how the treatment should be made to fit their personal arrangements. This is all very well, but if the doctor indulges their whims and ignores their disobediences, he may neither cure them nor hold them. I do not have to try it myself, so I am free to wonder if doctors would not be better off in certain cases if they put their feet down and said politely: "Sir, or Madam, if you don't like what I prescribe, and continue to ignore my instructions, you may go jump in the lake."

In the long run, of course, the greatest builder of faith is cures, and cures are not always possible. However, it seems logical that a doctor will be more successful in the long run if he sends those patients whom he cannot help to

other specialists in the field, rather than keep the patient coming to his office, and prescribing treatments for him which apparently accomplish nothing.

Medical men are taught that a patient presents two problems: diagnosis and treatment. Of the two, I should think that diagnosis might be the more difficult, for once correctly made, it can be followed with various treatments according to the textbooks. Yet, it is in the treatment where faith in the doctor is usually won or retained—and the doctor who is a genius varies his treatments to fit each patient as a separate and unique individual.

The social factors affecting the patient's life at home present an example of this—all-important in the development of faith in the doctor, and probably important in the cure itself. Financial security concerns every patient these days. The cost of the illness will worry him; but there are probably financial problems not concerned with his illness at all which are worrying him most. To what extent do they retard his recovery?

Racial, religious, and national mores may be a factor in the individuality of the illness; you are all familiar with tribal and social conventions the violation of which will cause the patient or his family to view the doctor with suspicion, or even with hostility.

It is the fashion these days, thank goodness, to talk of the emotional factors in illness. They are the special concern of the psychiatrist, yet one wonders whether the problems of emotional maladjustments may not be of far greater importance to the physician than to the psychiatrist; for the psychiatrist's chief business is with the acutely ill in mind, whereas the physician faces some degree of emotional pressure in practically every illness which he attacks.

I would be violating my privilege in addressing you if I more than mentioned the close relationship between stomach ulcers and anxiety. If a patient, man or woman, believes that an anxiety which he cannot control may be the chief factor in his illness, and feels that his doctor is doing nothing to deal with it except to urge on him an ocean voyage, or the surrender of responsibility which he cannot escape, that doctor is not doing much to deserve the patient's faith. I am curious to know how many genuine organic illnesses can be produced by the mind, in addition to those already known; and to what extent the mind, working in devious and subtle ways with the other organs, can stimulate or retard the pathologic conditions of the body. Medical science can, and must, do far more than it appears to have done to integrate the so-called somatic branches of medicine with psychiatry; and psychiatry, which even today is regarded by many as a quasi-scientific specialty beyond the pale of orthodoxy, to be called in only after every other approach has failed, must encourage this closer relationship.

A patient is a person—normally sensitive to pretense, sham and affectation in a doctor; faith in a doctor is not built on histrionics. Nevertheless, if a doctor is too candid in revealing his puzzlement with a case, or if he is too negative in his attitude, or even if his appearance reminds the patient of a man from Kansas City who slipped over a shady deal on him ten years ago, all the deep seated integrity in the world may not win the patient's faith.

Again quoting the dazzling Florentine: "You know that medicines when well used, restore health to the sick, and he who knows them well will use them well when he also knows what man is, and what life and the constitution are, and what health is. Knowing these he will know their opposites, and thus equipped, he will be nearer to devising a remedy than anyone else."

A layman does not necessarily have faith only in the greatest expert in a field. Experts, he knows, are busy people; some of them may be more interested in the bug than in its host. To the encouragement of those about to enter practice, a layman very often feels that a young man whose elders speak well of him may give him better attention, do a more thorough job, and probe the whole situation more diligently, than the older man who can rest on his laurels. As Francis Bacon put it, "The invention of young men is more lively than that of old men . . . (They are) fitter for execution than for counsel, and fitter for new projects than for settled business."

Did you ever hear two enthusiastic laymen discussing their doctors? Sometimes such debates with their silences are more eloquent than those involving the comparative achievements of each other's children. What better evidence is there that laymen can have, want to have, and usually do have faith in their doctors to an extent where they are willing to defend that faith at the cost of friendship?

The man who cannot afford to seek the private physician as a repository for his faith, is numerically dominant in such a community as this. It is a source of satisfaction to an institution like ours that such a person can place his faith in us with confidence and with hope. If he comes to us, he trusts, not any one doctor or nurse, but the place as a whole. He can believe that if the treatment is not successful, it will not be from lack of consultation, nor from lack of equipment, nor from lack of interest in him as a case.

But we who are loyal to these institutions have a temptation to overlook their faults. Their greatest danger lies in the very qualities which make their strength:—the danger that the impersonality of the gigantic organism will become a lack of personality in the individuals who serve it. It is not only that the patient must not be "that case of mitral stenosis in the second bed on the left;" the doctor, also, must not be "the second man in white who stuck the thing in my arm."

The only way in which a large hospital can keep itself human and treat its patients as human beings is by an unremitting attention to the danger on the part of every physician on its staff; and to their unflagging efforts to find ways to dissolve the fatty substance of automatism. You, who will be interns shortly, can do as much to prevent this disastrous error in the institutions where you will be, as can the seniors on your staffs.

I have read your Hippocratic Oath many times, with deep admiration for the members of your profession, who follow so generally the ideals in it as a religion. If you ask me how I think of a doctor, I will answer you that I like to think of him as the rare individual who comes closest to that ethical ideal which Spinoza set for all men: "The chief good," he says, "is that (a man) should

arrive, with other individuals if possible, at the possession of the aforesaid characters. What that character is . . . is the knowledge of the union existing between the mind and the whole of nature.

- "1. To speak in a manner intelligible to the multitude, and to comply with every general custom that does not hinder the attainment of our purpose. For we can gain from the multitude no small advantages provided that we strive to accommodate ourselves to its understanding as far as possible; moreover, we shall in this way gain a friendly audience for a re-reception of the truth.
- "2. To indulge ourselves with pleasures only insofar as they are necessary for preserving health.
- "3. Lastly, to endeavor to obtain only sufficient money or other commodities to enable us to preserve our life and health, and to follow such general customs as are consistent with our purpose."

If you who are graduating today can look back forty years from now, as others have done who preceded you, on a record of faith in you which you inspired in your patients, and of that much faith restored to an unhappy world, you will have played the part which will have brought you "So Near the Gods."

PROGRAM
FOR THE
FIFTY-FIRST ANNUAL MEETING
OF THE
ASSOCIATION of AMERICAN MEDICAL COLLEGES
TO BE HELD IN
ANN ARBOR, MICHIGAN
OCTOBER 28, 29 AND 30, 1940
HEADQUARTERS: MICHIGAN UNION

FIRST DAY: MONDAY
9:30 A. M.

The Internship.

WILLARD C. RAPPLEYE, *Dean,*
Columbia University College of Physicians and Surgeons.

Discussion opened by:

L. R. CHANDLER, *Dean,*
Stanford University School of Medicine.

CURRIER McEWEN, *Dean,*
New York University College of Medicine.

R. C. CUNNINGHAM, *Dean,*
Albany Medical College.

D. M. MORRILL, *Medical Superintendent,*
Receiving Hospital, Detroit.

CYRUS C. STURGIS, *Professor of Internal Medicine,*
University of Michigan.

J. E. McINTYRE, *Secretary,*
Michigan State Board of Registration in Medicine.

General Discussion.

The Expanding Phases of Postgraduate Medical Education.

JAMES D. BRUCE, *Vice President,*
University of Michigan, in charge of University Relations.

Discussion.

University of Michigan System of Residence Halls.

KARL LITZENBERG, *Professor,*
University of Michigan.

1:00 P. M. Luncheon—Michigan Union

**In the afternoon, the delegates will visit the campus buildings, the
Medical School and the University Hospital.**

7:00 P. M. Dinner (informal) at the Michigan Union.

Speakers:

ALEXANDER G. RUTHVEN, *President,*
University of Michigan, and
RUSSELL H. OPPENHEIMER, *President of the*
Association of American Medical Colleges.

Entertainment:

LITTLE SYMPHONY.
UNIVERSITY GLEE CLUB.

SECOND DAY: TUESDAY

9:30 A. M.

Preparation for the Study of Medicine.

LOUIS R. BREDVOLD, *Professor of English and Chairman of the Department of*
English Language and Literature.

HOBART H. WILLARD, *Professor of Chemistry,*

HARLEY H. BARTLETT, *Professor of Botany, Chairman of the Department of*
Botany and Director of the Botanical Gardens.

PRESTON W. SLOSSON, *Professor of History.*

C. V. WELLER, *Professor of Pathology.*

CYRUS C. STURGIS, *Professor of Medicine.*
(All members of the faculty of the University of Michigan.)

Discussion opened by:

BRUNO MEINECKE, *Associate Professor of Latin and*

RANDOLPH C. ADAMS, *Director of the Clements Library of American History,*
University of Michigan.

W. A. PERLZWEIG, *Professor of Biochemistry,*
Duke University School of Medicine.

REVEREND ALPHONSE M. SCHWITALLA, *Dean,*
St. Louis University School of Medicine.

WM. C. MacTAVISH, *Professor of Chemistry,*
Washington Square College, New York University.

General Discussion.

1:00 P. M. Luncheon—Victor Vaughan House.
Visit to the Clements Library.

4:00 P. M. Executive Session begins.

6:30 P. M. Dinner for delegates.

8:00 P. M. Executive session resumed.

THIRD DAY: WEDNESDAY

9:00 A. M.

"Know Your Money." Film to be shown by the United States Secret Service: Treasury Department.

Professional and Graduate Education.

C. S. YOAKUM, *Dean,*
Rackham School of Graduate Studies, University of Michigan.

Industrial Hygiene Instruction for Medical Students.

DONALD E. CUMMINGS, *Director,*
Division of Industrial Hygiene, University of Colorado School of Medicine.

Discussion opened by:

VOLNEY S. CHENEY, *Medical Director,*
Armour & Company.

Teaching of Anatomy.

B. D. MYERS, *Emeritus Dean and Professor of Anatomy,*
Indiana University.

Teaching of Pharmacology.

PAUL LAMSON, *Professor of Pharmacology,*
Vanderbilt University School of Medicine.

Some Observations on the Teaching of Pharmacology.

LINN BOYD, *Professor of Medicine and Pharmacology,*
New York Medical College.

Discussion on Papers of Drs. Lamson and Boyd opened by:

FREDERICK F. YONKMAN, *Professor of Pharmacology,*
Wayne University College of Medicine.

Teaching of Bacteriology.

GEORGE H. SMITH, *Professor of Immunology,*
Yale University School of Medicine.

A Plan for the Protection of Medical Research.

GEORGE E. WAKERLIN, *Professor and Head of the Department,*
University of Illinois College of Medicine.

Adjournment.

The Committee for the Entertainment of the Ladies has prepared a program for Monday and Tuesday. Announcement as to details will be made at the opening of the meeting on Monday morning.

JOURNAL
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Number 5

Burke-Wadsworth Bill

At the time of writing, this bill has not yet passed Congress. Many amendments have been made to the bill and many have been withdrawn. No one has the least idea, apparently, when the bill will be passed nor in what form. There seems to be a disposition to postpone passage until the January session of Congress. In the meantime, all departments of the government are making plans to meet any emergency and any form of the bill as it will finally pass both Houses of Congress.

So far as medical students are concerned, it is certain that the President does not want them drafted; nor does he want them to enlist. It is his desire that medical students, and others working in fields which are essential during a state of war, continue their studies, including the internship. The President's wishes were expressed to representatives of the Association of American Medical Colleges during a recent call by the head of a service who gave permission to make these statements. It seems to be evident that the B-W bill will not provide for any exemptions. But, undoubtedly, exemptions will be made possible by action of government departments.

So far as medicine is concerned, the navy, army and public health services will be the exempting services. Students who are in the R.O.T.C. units will be treated as will those who are not in the units. Or, it may be possible that they will be enlisted and assigned to continue their studies. In any event, medical students will not be drafted and they will be encouraged to carry on their work.

Until the B-W bill is passed, it is not possible to state definitely how the teaching personnel of medical schools will be handled. But this can be said: No one

who has passed the age of 50 will be accepted for service, except in special cases where outstanding expertness comes into question. Men who have been in the reserve for twenty years may be encouraged to seek retirement on the inactive list. Every applicant for service will be subjected to a rigid physical examination, whether in the reserve or not. A history of pulmonary tuberculosis at any time, whether the disease is quiescent or not—and no matter for how long—will be an absolute reason for nonacceptance.

Furthermore, the services will be extremely anxious to conserve the highest possible quality of instruction in the college. Therefore, it was stated, that the medical colleges will be the ones to decide who can and who cannot be spared, even in the case of applicants for service. So far as the Army is concerned, the corps area commander is the one to contact in such cases. For the Navy and the Public Health Service, the surgeons general should be contacted directly. Doctors in large numbers will be needed for the services but the needs of the general public and of the medical schools must be met and served in the highest degree. During the last war, 3½ per cent of the available civilian population was in the service and 25 per cent of available physicians were in service. The ratio of physicians to enlisted personnel is set at 7.5, which will give an adequate idea as to the number of physicians needed for whatever number of men will be under arms.

It is planned that a coordinator will be appointed for the medical services of the government. This man will not have any connection with any of the groups, organizations or societies which will cooperate with these services in supplying

needed personnel. He will be selected on the basis of merit and will have direct charge of securing adequate professional personnel without crippling any of its normal functions or activities.

In the absence of definite information as to what can or will be done, it is evident that the plan selected after the B-W bill passes to secure adequate professional personnel will be a cooperative one as well as a conserving one.

In the meantime, it will be advisable for medical schools to consider eliminating vacations as an emergency measure. This will make possible graduating students in three calendar years and step up the supply of physicians. It is estimated that about 70 per cent of every graduating class may be available for service. By graduating after three years, this supply will be stepped up 25 per cent. The Army, Navy and Public Health Services would like to have the medical schools consider this plan seriously. In all probability, not every medical school can do this, although with good planning it may be done. At any rate, now is the time to think about this plan. Three schools are already operating on this basis. There is no thought of lowering standards in any way nor of increasing the number of students admitted each year. In other words, the effectiveness of education must not be lessened in any way.

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Announcement of Intern Appointments

Although a few scattered replies to a questionnaire are still being received, it is justifiable at this time to analyze the results of the second appeal made to hospitals to announce appointment of interns on a uniform date—November 15.

As finally corrected, the list of hospitals approved for intern training contained the names of 727 institutions. Some hospitals in this group now employ house physicians instead of interns. These house officers must have served in a one year rotating internship. Of these

727 hospitals, 616 agreed to cooperate in making intern appointment announcement on November 15th. These hospitals appoint 6,685 interns (84.2% of all interns—7,822 in 727 hospitals). Forty hospitals (5.5%), using 604 interns (8.0%) stated definitely that they would not cooperate—some because they could not; 10 hospitals (1.4%) have the matter under advisement (employing 152 interns—2.6%); and 61 hospitals have failed to answer a second request for a reply to the original letter sent out. These 61 hospitals (8.4%) employ 381 interns (5.2%).

These figures definitely emphasize the fact that, on the whole, hospitals are willing to cooperate in any effort made to do something to stabilize the internship, to solve the problems by which it is beset. With such fine cooperation, any program is bound to work out alright eventually. Time and patience, a constant pounding away to attain the objective will bring success.

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Annual Meeting: Ann Arbor

The fifty-first annual meeting of the Association of American Medical Colleges will be held in Ann Arbor, Michigan, October 28-30, 1940. A cordial invitation to attend this meeting is extended to any one who is interested in medical education and in teaching.

The program will feature a general discussion of the internship; a series of papers by members of the University of Michigan faculty on the proper preparation for the study of medicine and a continuation of study after graduation; and pedagogic papers on various subjects included in the medical curriculum. For the first time the teaching of industrial hygiene will be discussed by the head of such a department of teaching in a state university medical school. Elsewhere in this issue (p. 337) is published the program for the meeting. Visitors are urged to take part in the discussion of papers read.

College News

Stanford University School of Medicine

Postgraduate medical courses for practicing physicians will be given, in cooperation with the San Francisco Department of Health and the San Francisco Hospital, September 9 to 13, inclusive. The registration fee is \$25. Applications should be made to the Dean of the Medical School, 2398 Sacramento Street.

Six half-day courses will be given: Pediatrics, gastroenterology, surgical anatomy and operative technic, management of hypertension and nephritis, X-ray diagnosis and therapy and proctology. An additional fee of \$10 will be charged for the course in surgical anatomy to defray cost of material.

The following full day courses will also be given: Surgical emergencies, traumatic injuries and fractures; otorhinolaryngology and anesthesiology. An additional charge of \$10 will be made for the second named course.

Three general evening meetings will be held: Chemical warfare against bacterial diseases; emotions at war and clinicopathological conference.

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New York University College of Medicine

Appointments: Dr. Daniel B. Kirby, professor of ophthalmology; Dr. Otto Loewi, research professor of pharmacology; Dr. Bernhard Dattner, assistant clinical professor of neurology; Dr. Howard C. Taylor, Jr., associate professor of obstetrics and gynecology.

Resignations: Dr. Edward R. Maloney, professor of dermatology and syphilology was appointed professor emeritus. Dr. Dugald E. S. Brown, assistant professor of physiology to become professor of physiology at New York University College of Dentistry.

Promotions: Dr. Samuel Brock, from

associate professor to professor of neurology; Dr. S. Bernard Wortis, from assistant professor to associate professor of neurology; Dr. Harry Bakwin, from assistant professor to associate professor of pediatrics; Dr. Walter H. McNeill, from clinical professor to associate professor of urology; Dr. Leo Spiegel, from assistant clinical professor to clinical professor of dermatology and syphilology; Dr. James S. Hanley, from assistant clinical professor to assistant professor of otorhinolaryngology; Dr. Aaron Bell and Dr. Mary E. O'Sullivan, from instructor to assistant clinical professor of neurology; Dr. John C. McCauley, from instructor to assistant professor of orthopedic surgery; Dr. Philip Palew and Dr. William A. Walker, from instructor to assistant clinical professor of orthopedic surgery; Dr. Katharine G. Dodge and Dr. Rosa Lee Nemir, from instructor to assistant professor of pediatrics; Dr. Ruth Bakwin, from instructor to assistant clinical professor of pediatrics; Dr. Lester Breidenbach, Dr. Elmer I. Huppert and Dr. Kenneth M. Lewis, from instructor to assistant clinical professor of surgery; Dr. William M. Dick, Dr. Eugene H. Moyle and Dr. James B. Shannon, from instructor to assistant clinical professor of otorhinolaryngology; Dr. Robert S. Hotchkiss, from instructor to assistant professor of urology.

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Western Reserve University School of Medicine

Changes in Curriculum: This medical school has decided to substitute required additional work in biochemistry, biostatistics, medical psychology, physiology, pathology and immunology for the optional work in the first year and several optional courses of the second year. Experience indicates that this is advisable to insure a sufficient knowledge of fundamental subjects. Neuroanatomy will be moved from the second year to

the first year. The total number of required hours is increased from 850 to 1017 in the first year, and reduced from 904 to 864 in the second year.

Increase of tuition fees: The basic fee in the medical school will be increased from \$400 to \$500 for all classes beginning with the academic year of 1941 to 1942. The announcement is made a full year in advance to give students the opportunity to adjust themselves to the situation. The increase is necessary to meet in part the diminished returns of endowments. Incidental fees remain essentially at the present level.

The Ella Sachs Plotz Foundation for the Advancement of Scientific Investigation has made a grant of \$300 to Dr. John Paul Quigley of the department of physiology for a study of the process of gastric evacuation.

Dr. William W. Greulich, director of the Brush Foundation and professor of physical anthropology and anatomy of the School of Medicine of Western Reserve University, announces that the Rockefeller Foundation has added \$12,000 to the allotment already made to the Brush Foundation for the assessment of child health and development.

The Brush Foundation will expand its program, in which four thousand children are recorded in its files. Its program of examination is to make the assessment of children as to their physical, mental, emotional and psychological growth of value to institutions, teachers and parents all over the country.

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*University of Colorado
School of Medicine*

Promotions and Appointments: Ernest H. Brunquist, Ph.D., promoted to associate professor of physiology and pharmacology; Jack G. Hutton, B.A., M.D., and Osgoode S. Philpott, M.D., promoted to assistant professors of dermatology and syphilology; Frank B. Stephenson, M.D., and John S. Bouslog, M.D., promoted to assistant professors of radiology.

Resignations: Charles E. Sevier, B.S.,

M.D., associate professor of surgery (Orthopedics) on account of ill health; Harold B. Henderson, B.S., M.D., assistant professor of obstetrics and gynecology on account of ill health; Paul D. Garvin, M.D., assistant professor of clinical pathology to go into private practice.

The following students won prizes for outstanding scholarship records as follows: Winifred Mary Riggs (Junior Class), the Carbon Gillaspie, M.D., Memorial Prize in Applied Anatomy; Dorothy Jean Clark (Sophomore Class), the Chester H. Elliott Memorial Prize in Pathology; Robert H. Samuel Redwine (Freshman Class), the Alpha Omega Alpha Prize in Anatomy; Robert William Rasor and Chester Pratt Stevenson (Junior Class), the John G. Ryan, M.D., Prize given for the best case report.

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*State University of Iowa
College of Medicine*

Promotions: Dr. Erwin G. Gross, to head of the department of pharmacology; Dr. Walter R. Ingram, to professor and head of the department of anatomy, neuroanatomy, histology and embryology; Dr. Rubin Flocks, to associate professor of urology; and Dr. Irving H. Borts, to assistant professor of hygiene and preventive medicine.

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*University of Cincinnati
College of Medicine*

Dr. Albert Prescott Mathews resigned as Carnegie Professor of Biochemistry, effective July 1, 1940. Dr. Mathews came to this school from the University of Chicago School of Medicine to assume the Andrew Carnegie Professorship of Biochemistry in 1918. His retirement from the professorship removes one of the few remaining pioneers in the field of physiological chemistry. He has been succeeded by Dr. Milan A. Logan, formerly of the department of biological chemistry at Harvard University.

*Columbia University
Medical Faculty*

Dr. Francis Carter Wood has been made director emeritus of the Institute of Cancer Research. The institute has been converted into the department of cancer research of the medical school, with Dr. William H. Woglom, associate professor of cancer research, as acting executive officer of the department.

Dr. Wesley C. Bowers, director of the ear, nose and throat department of St. Luke's Hospital, has been named clinical professor of otolaryngology and Nicholas Kopeloff, Ph.D., research bacteriologist at the New York State Psychiatric Institute, has been appointed assistant professor of bacteriology.

*Temple University
School of Medicine*

Dr. William N. Parkinson was re-elected president, E. Kirby Lawson, Jr., vice president and Reuben Friedman, secretary and treasurer of the Temple Alumni Association.

Dr. Waldo E. Nelson, associate professor of pediatrics, University of Cincinnati, has been appointed professor of pediatrics at Temple.

*Vanderbilt University
School of Medicine*

The College of Physicians of Philadelphia awarded the Alvarenga Prize, July 14, to Dr. Ernest W. Goodpasture, professor of pathology, for his outstanding contributions to the knowledge of viruses.

*University of Oregon
Medical School*

A new library and auditorium was dedicated in Sam Jackson Park, June 7. Dr. John E. Weeks, honorary professor of ophthalmology in the medical school, who contributed the first \$100,000 toward the building, laid the cornerstone and later a plaque honoring Dr. Weeks was unveiled in the main entrance hall of the library. In addition to the dona-

tion by Dr. Weeks, funds for the library were provided by the Rockefeller Foundation (\$100,000) and the Public Works Administration (\$163,000).

*Medical College of the
State of South Carolina*

Dedicated recently was a new building which contains facilities for the school of nursing and the school of medicine and for clinical work. Funds for the building were furnished by the alumni association of the medical school, which contributed \$172,000, and a PWA grant of \$141,000. The clinic building has been named the Alumni Memorial Clinic. The college buildings, new and old, now form three sides of a rectangle which occupies more than two blocks. At the dedication ceremony it was announced that \$125,000 had been given anonymously for an auditorium that will complete the rectangle. Preceding the dedication of the building, memorial tablets were unveiled honoring the memory of chairmen of the board of trustees and deans of the college since its founding in 1824.

*University of California
Medical School*

Langley Porter, M.D., former Dean, has been given the title "Dean Emeritus."

New appointments: Douglas G. Campbell, M.D., assistant clinical professor of psychiatry; Hubert R. Hathaway, M.D., assistant professor of anaesthesia.

Promotions: Roberto F. Escamilla, M.D., and Richard D. Friedlander, M.D., instructor in medicine to assistant clinical professor; Otto E. Guttentag, M.D., assistant professor of homeopathy to associate professor; Carl L. Hoag, M.D., assistant clinical professor to associate clinical professor of surgery; Salvatore P. Lucia, M.D., assistant professor of medicine to associate professor; Frances A. Torrey, M.D., instructor of dermatology to assistant clinical professor.

Funds have been appropriated by the regents to construct a \$300,000 student health service building for the Los Angeles campus of the University of California. The plans provide a complete health service for the Los Angeles students exclusive of hospitalization. The regents increased the incidental fee on the Los Angeles campus from \$23 to \$25 for the added service. At present, the limited health service available to a student body of about 8,500 is crowded into cramped quarters and operated by part time employees. On the basis of experience on the Berkeley campus, it is estimated that the health service would require a floor area of about 23,500 square feet.

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Woman's Medical College of Pennsylvania

New Grants for Cancer Research: The International Cancer Research Foundation has voted a grant of \$1200 to the College for the use of Dr. Catharine Macfarlane for her studies in the prevention of cancer of the uterus.

The Woman's Field Army of the State of Pennsylvania has given the sum of \$250 to Dr. Macfarlane for the support of the same research.

Dr. Eleanor Scott, Cancer Research Fellow in the Department of Gynecology, has been awarded a Mary Putnam Jacobi Fellowship of \$500 by the Medical Women's Association of New York City.

Dr. Margaret D. Craighill has been appointed dean to succeed Dr. Martha Tracy, resigned.

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University of Michigan

The new \$500,000 health service building was recently placed in operation. Accommodations are available for sixty patients. PWA funds were used to construct the building, in which will be available a program of clinical medical service for resident students. Certain attention to faculty members and university employees may be provided, it was said. The use of the hospital con-

nected with the medical school will continue for major surgery, and less frequent highly specialized services. Recent average daily outpatient visits amounted to 570 and annual regular session bed patient admissions have been 217 per thousand students enrolled. Operating costs of the health service total about \$15 annually for each student, and these are defrayed from the regular tuition fees. Dr. Warren E. Forsythe is director of the health service.

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University of Pennsylvania School of Medicine

Plans for construction of a cyclotron for use primarily in medical research, were made possible by a gift of \$200,000 from William H. Donner, retired industrialist, and providing the basis for a line of research believed to hold substantial promise for the study and treatment of cancer.

Mr. Donner designated his gift for the cyclotron as an addition to his contribution of an equal amount in 1937 to establish the William Henry Donner, Jr., Department of Radiology, in memory of his son. The cyclotron will be installed in a specially constructed building adjoining the Department of Radiology, in the rear of the new unit of the University Hospital now under construction on the south side of Spruce Street between 34th and 36th Streets.

The potential benefits of this new cancer therapy and research program will be enhanced by Pennsylvania's operation of the new Foundation for the Study of Neoplastic Diseases, established at the University last month by the Penn Mutual Life Insurance Company to coordinate and compare the various methods and results of cancer treatment in all divisions of the University Hospital and to make available the soundest possible laboratory and clinical data.

Another significant advantage lies in the activity of the Eldridge R. Johnson Foundation for Research in Medical Physics at the University of Pennsylvania, which it is expected will both

serve and be served by the new research program in the Department of Radiology.

Although the study and treatment of cancer will be the primary objective for which the cyclotron will be used, in accordance with the interest which chiefly motivated Mr. Donner in making the gift, it will be possible to use the apparatus concurrently for the benefit of such departments of the University as those of physiology, biology, botany, research medicine, physics, and chemistry.

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Creighton University School of Medicine

Beginning next fall, the School will issue a Bulletin (possibly quarterly) to the medical alumni. The purpose of the Bulletin will be to acquaint the alumni with the activities of the faculty by printing short abstracts of papers, addresses given before scientific and medical societies and preliminary reports of research in progress. News items of particular interest to the alumni will also be included.

The Bulletin will be under the direction of an editorial board consisting of: Dr. H. F. Gerald, Dr. C. S. Simkins, Dr. V. E. Levine, Dr. F. C. Hill, and Dr. Jeff Minckler.

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Duke University School of Medicine

May 23rd, Dr. Mark V. Ziegler, Assistant Surgeon, U. S. Public Health Service, Washington, D. C., lectured to the students on "Opportunities in the Public Health Service."

In the autumn quarter, 1939, the Duke Medical Historical Society was organized by the students of the School of Medicine, with eighteen members. Meetings are held every two weeks. At

each meeting, one of the members, or a guest speaker, discusses some phase of medical history.

At the Commencement exercises, held June 3rd, there were fifty-eight candidates for the degree of Doctor of Medicine, five for the degree of Bachelor of Science in Medicine. The following seniors in the School of Medicine were elected to Alpha Omega Alpha Honorary Fraternity: I. W. Brown, Jr., R. Brown, J. W. Kelley, G. H. Kostant, R. W. Rundles and W. L. Venning, Jr. James W. Kelley, recommended by the Department of Surgery, received a year's subscription to *Surgery*, and H. Grant Taylor, recommended by the Department of Pediatrics, received a year's subscription to the *Journal of Pediatrics*, as scholarship awards from The C. V. Mosby Company.

July 15, the new addition to the hospital was opened for full use, with 113 beds for private and semi-private patients, and offices and examining rooms for the medical and surgical private diagnostic clinics. The wards in the new addition have been named as follows: Surgical, Cushing; obstetrical and gynecological, Williams and Holmes; surgical children, Matas; medical, Minot, and psychiatric, Meyer.

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University of Oklahoma School of Medicine

Aided by a grant from the Children's Bureau, the Oklahoma Commission for Crippled Children has established a rheumatic fever and heart service to be carried out through the department of pediatrics of the School of Medicine and the Crippled Children's Hospital, Oklahoma City. Clinics are held and eight beds have been set aside in hospitals for patients with active infection. A new ward of sixteen beds has been opened in the Crippled Children's Hospital for Negro children.

General News

The Ashford Award in Tropical Medicine

At the annual meeting of the American Society of Tropical Medicine in Memphis, Tenn., the Bailey K. Ashford Award in Tropical Medicine was established by Eli Lilly & Co. to be awarded on alternate years for a total of three times. The award will be \$1,000 and a bronze medal suitably engraved. An additional amount of \$150 or as much thereof as may be necessary is available toward traveling expenses for the recipient of the award. It will be given biennially in recognition of demonstrated research in the field of tropical medicine, taking into consideration independence of thought and originality. The investigator must be a citizen of the United States and less than 35 years of age on January 1 of the year in which the award is made. The recipient must not be associated with a commercial laboratory and need not be a member of the American Society of Tropical Medicine. Members of the American Society of Tropical Medicine are to submit to the secretary of the society in triplicate the name of a proposed recipient with information concerning his personality and training and a statement of the research work for which the award is to be made. All nominations must be in the hands of the secretary at least sixty days before the dates of the annual meeting at which time the award is to be made. The recipient will be given opportunity to present a short review of his work at the meeting. The committee of award shall consist of the president of the society ex officio and three members of the society, each to serve for a period of six years, one to be elected every other year at the annual meeting by the council, except that the original committee be elected at once by the council on nomination of the president, one member to be elected for

six years, one for four years and one for two.

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The Society of the New York Hospital Lewis Cass Ledyard, Jr. Fellowship

The Lewis Cass Ledyard, Jr., Fellowship was established in 1939 by a gift from Mrs. Ruth E. Ledyard, wife of the late Lewis Cass Ledyard, Jr., a Governor of The New York Hospital. The income, amounting to approximately \$4,000.00 annually, will be awarded to an investigator in the fields of medicine and surgery, or in any closely related field. This amount will be applied as follows: \$3,000.00 as a stipend and, approximately, \$1,000.00 for supplies or expenses of the research. In making the award, preference will be given to younger applicants who are graduates in medicine, and who have demonstrated fitness to carry on original research of high order. The recipient of this Fellowship will be required to submit reports of his work under the Fellowship, either at stated intervals or at the end of the academic year; and when the result of his work is published he will be expected to give proper credit to the Lewis Cass Ledyard, Jr. Fellowship. The research work under this Fellowship is to be carried on at The New York Hospital and Cornell University Medical College. The fellowship will be available on July 1st at the beginning of the academic year. Applications for the year 1941-42 should be in the hands of the Committee by the 15th of December. It is expected that the award will be made by March 15th, 1941.

Application for this Fellowship should be addressed to: The Committee of the Lewis Cass Ledyard, Jr. Fellowship; The Society of The New York Hospital, 525 East 68th Street, New York, N. Y.

Book News

Textbook of Biochemistry

By Benjamin Harrow, Ph.D., Professor of Chemistry, College of the City of New York. 2nd Ed. W. B. Saunders Company, Philadelphia. 1940. Price, \$3.75.

Concise; clearly written; authoritative.

* *

Hearing and Equilibrium

By H. Macnaughton-Jones, M.B., Clinical Assistant, Ear and Throat Department, North London Hospital. A William Wood Book: The Williams & Wilkins Company, Baltimore. 1940. Price, \$2.50.

A careful study of the ear and the function of hearing.

* *

Textbook of Public Health

By W. M. Frazer, M.D., Professor of Hygiene, University of Liverpool, and C. O. Stallybrass, M.D., Lecturer on Public Health Administration, University of Liverpool. 10th Ed. A William Wood Book: The Williams & Wilkins Company, Baltimore. 1940. Price, \$6.50.

For one who intends to specialize in public health administration, this is an excellent book. Even the medical student will find much of value to him in it. Among other topics, the medical aspects of civil air defence, welfare of the blind, genetics, school medical service and hospital administration are each given special chapters. A unique book.

* *

Introduction to Biochemistry

By William R. Fearon, M.B., Fellow of Trinity College, Dublin. 2nd Ed. The C. V. Mosby Company, St. Louis. 1940. Price, \$3.75.

Small in size; comprehensive; a purely chemical approach to the subject from fundamentals; an approach to the living organism through inorganic biochemistry. Students will appreciate this text.

* *

A Textbook of Physiology

By William H. Howell, M.D., Emeritus Professor of Physiology, Johns Hopkins University. 14th Ed. W. B. Saunders Company, Philadelphia. 1940. Price, \$7.50.

An authoritative teaching text for so many years that it needs no introduction. The standard of excellence is maintained and revision is wholly up-to-date.

Principles of Surgical Care, Shock and Other Problems

By Alfred Blalock, M.D., Professor of Surgery, Vanderbilt University School of Medicine. The C. V. Mosby Company, St. Louis. 1940. Price, \$4.50.

An extension and amplification of the Beaumont Lectures for 1940; based on personal observation and experimentation in the surgical laboratory of research. A fine piece of work.

* *

Green's Manual of Pathology

Revised and Enlarged by H. W. C. Vines, M.D., Director of the Charing Cross Hospital Institute of Pathology. 16th Ed. A William Wood Book: The Williams & Wilkins Company, Baltimore. 1940. Price, \$8.50.

A successful attempt to provide the student with some evidence of the essential continuity between academic physiology, pathology and the applied medical arts. Bacteriology and parasitology have been omitted, which is well. The book is well and profusely illustrated. For many years, it has been a standard text for pathology. The present author has added much of value.

* *

An Introduction to Biochemistry

By William R. Fearon, Fellow Trinity College, Dublin. 2nd Ed. The C. V. Mosby Company, St. Louis. (With an Introduction by Victor C. Myers.) 1940. Price, \$3.75.

A small but comprehensive presentation of the necessary facts of pure chemistry interwoven with biochemistry to form a unified whole. The book does help to clarify the subject, therefore the medical student can use it profitably.

* *

Handbook of Microscopic Characteristics of Tissues and Organs

By Karl A. Stiles, Ph.D., Professor of Zoology and Chairman of the Division of Natural Sciences, Coe College. The Blakiston Company, Philadelphia. 1940. Price, \$1.50.

This book presents in outline form the main characteristics of the fundamental vertebrate tissues and the histological structures of the organs of the body. Intended for use as a supplementary textbook of histology, the book will render great service in the laboratory in guiding the student in identification studies. Several charts classifying

epithelial tissues indicate their origin and location; a plate shows surface and profile views. Other tissues are described in outline form with examples of where they are found, how they appear in longitudinal and cross sections, characteristics of nucleus and cytoplasm, etc. Medical students can make good use of this book.

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Manual of Medical and Surgical Emergencies

Edited by J. C. Geiger, M.D. Director, Department of Public Health, City and County of San Francisco, California. 1940. J. W. Stacey, Inc., San Francisco. 1940. Price, \$2.50.

With the collaboration of fifty-four specialists, Dr. Geiger presents specific information on the handling of all common medical and surgical emergencies. Drugs, poisonings, fractures, severed tendons, head injuries, facial repair, cardiac emergencies, burns, rashes and skin diseases, rape, emergencies of children, gunshot wounds, and other urgent conditions are given in detail for rapid diagnosis and treatment.

Each specialist has written of the emergencies common to his practice. Each chapter is a concise, clear explanation of the reliable procedures to be followed. Instructions are exact and meticulously accurate.

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Histopathology of the Peripheral and Central Nervous Systems

By George B. Hassin, M.D., Professor of Neurology, University of Illinois, College of Medicine. 2nd Ed. Paul B. Hoeber, Inc., New York. 1940. Price, \$7.50.

Rewritten, bringing the very latest developments in the histopathology of the nervous system. It discusses virtually every important disorder in minute detail, including sixteen forms of meningitis and forty-two types of encephalitis. There are clear descriptions of degenerative and inflammatory conditions, and poisonings of the central nervous system; microincineration; megalencephaly; brain swelling and mongolian idiocy; etc. Describes histologic changes in individual nervous diseases of the peripheral nerves, spinal cord and brain, similar to the plan of textbooks on "clinical" neurology. Each chapter has its own comprehensive bibliography, and the index is complete.

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Manson's Tropical Diseases

Edited by Philip H. Manson-Bahr. 11th Ed. A William Wood Book: The Williams & Wilkins Company, Baltimore. 1940. Price, \$11.00.

The last word on tropical diseases.

A Manual of Otolaryngology, Rhinology and Laryngology

By Howard C. Ballenger, M.D., Assistant Professor of Otolaryngology, Northwestern University Medical School. Lea & Febiger, Philadelphia. 1940. Price, \$3.75.

Written primarily for the medical student. Text is clear and concise, emphasizing essentials only. Accepted treatments are presented; omitting unnecessary theories and surgical technic. A good book for the student.

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Synopsis of the Principles of Surgery

By Jacob K. Berman, M.D., Assistant Professor of Surgery, Indiana University School of Medicine. The C. V. Mosby Company, St. Louis. 1940. Price, \$5.

A correlation of basic sciences with the fundamental principles of surgery. Well illustrated. It is too large for a small book; much could have been omitted without detracting from the essentials. Too many illustrations; too many references — which really do not belong in a book of this type. What the student should have is presented well and if that only were included, the book would be a student text, rather than an attempt to include as much as possible of the larger works on surgery.

A Manual of Otolaryngology, Rhinology and Laryngology

By HOWARD CHARLES BALLENGER, M.D., F.A.C.S., Assistant Professor of Otolaryngology, Northwestern University School of Medicine, Chicago, Illinois

Octavo, 302 pages, illustrated with 90 engravings and 4 color plates.
Cloth, \$3.75, net.

This work has been written to fill the increasing need for a concise textbook on diseases of the nose, throat and ear which should emphasize anatomy, etiology, symptoms and diagnosis. It includes, in most part, only the accepted general and local treatments. It meets the needs of the undergraduate and of the general practitioners who are not specialists in this field.

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